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September 2020
Updated: November 2020

# Northern Madison County Sanitation District

## Regional Facilities Plan

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# Abbreviations/Acronyms

| | |
|---|---|
| **$BOD_5$** | Five-day Biochemical Oxygen Demand |
| **DO** | Dissolved Oxygen |
| **EPA** | US Environmental Protection Agency |
| **FEMA** | Federal Emergency Management Agency |
| **ft** | Feet |
| **gpcd** | Gallons per Capita (Person) per Day |
| **GPD** | Gallons per Day |
| **GPM** | Gallons per Minute |
| **HP** | Horsepower |
| **I/I** | Infiltration/Inflow |
| **KDOW** | Kentucky Division of Water |
| **KIA** | Kentucky Infrastructure Authority |
| **KNREPC** | Kentucky Natural Resource and Environmental Protection Agency |
| **KPDES** | Kentucky Pollutant Discharge Elimination System |
| **lbs/day** | Pounds per Day |
| **LF** | Linear Foot |
| **MGD** | Million Gallons per Day |
| **mg/L** | Milligrams per Liter |
| **MGY** | Million Gallons per Year |
| **MSL** | Mean Sea Level |
| **NMCSD** | Northern Madison County Sanitation District |
| **$NH_3$-N** | Ammonia Nitrogen |
| **OH&P** | Overhead and Profit |
| **OM&R** | Operation, Maintenance and Replacement |
| **O&M** | Operation and Maintenance |
| **PA** | Planning Area |
| **PE** | Population Equivalent |
| **pH** | Measure of Acidity/Alkalinity |
| **PS** | Pump Station |
| **RAS** | Return Activated Sludge |
| **RD** | Rural Development |
| **SBR** | Sequencing Batch Reactor |
| **$SO_2$** | Sulfur Dioxide |
| **SU** | Standard Unit |
| **TDH** | Total Dynamic Head |
| **TSS** | Total Suspended Solids |
| **TU** | Toxicity Unit |
| **UV** | Ultraviolet |
| **WAS** | Waste Activated Sludge |
| **WWTP** | Wastewater Treatment Plant |

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## Section 1 – Regional Facility Plan Summary

### General

This document considers future development and improvements to the Northern Madison County Sanitation District (NMCSD). The planning period is for the next 20 years, beginning in 2020 and running to 2040. The planning period is broken down into three planning phases; Phase I is from 0 to 2 years (2020 through 2022). Phase II runs from year 3 through year 10 (2023 through 2030). Phase III goes from year 11 to year 20 or the end of the planning period (2031 through 2040).

The NMCSD serves customers in the rural area of Madison County outside of the two Cities of Richmond, the County Seat, and Berea. The District was created in 1996 as an outgrowth of the Madison Village Homeowners Association collection and treatment system. The service area is generally north of Berea and encompasses most of the rural area outside of the City of Richmond. There is a large U.S. Military Base, Blue Grass Army Depot (BGAD) located southeast of Richmond, which is not served by NMCSD, apart from a small residential area east of US 421. NMCSD also serves the area located south of the City of Richmond and generally in the triangle created by US 25, US 421.

The current number of customer count is approx. 2,000. This plan projects this number to increase to approx. 3,000 by the year 2040. Additional details of the population projections and customer projections are presented later in this report.

This southern service area was part of another Sanitation District that was merged into NMCSD in November, 2007.

The soils of Madison County are generally not suited for on-site wastewater disposal. See the letter dated May 20,2020 from the County Environmental Health Program Manager, Mr. Dixon, R.S. This letter is located in the Appendix Section 1-2.

### Overview of the Plan

This plan looks at the challenging objective to provide public wastewater collection and treatment in the rural areas of Madison County over the ensuing 20-year period in an area where the soils are not conducive to on-site treatment. Table 1-1 presents the proposed projects that address the need for wastewater services in Madison County in the areas outside of Richmond and Berea.

There is no need for any institutional arrangements as the planning area investigated to be served is beyond any existing Planning Area boundary. Mitigation letters are included in Section 10 of this report.

User fees, and funding for the initial projects are presented in great detail in Section 11 of this report. The current rates should be sufficient to cover each project, based on the anticipated future funding, rates, loan forgiveness, grants, etc. postulated for those projects. The District has an adopted goal for each project to be self-sustaining and be able to support any required debt service with the added revenue from the project. An exception to this would be studies and I&I correction projects which the District could self-fund.

The District has an approved funding commitment from the Kentucky Infrastructure Authority (KIA) to complete Project 0-2A and plans to self-fund Project 0-2B.

Beyond these two initial projects, the timing of future projects becomes subjective due to the many unknowns of the future. However, a projected implementation schedule, for all projects is estimated and shown as Table 11-3 located in Section 11 of this report.

**Planning Periods**

As stated before, this planning document looks at three different planning periods and projected or proposed improvements within these planning periods: 0-2 years, 3-10 years and 11-20 years. Table 1-1 identifies these proposed improvements along with the opinion of projected project costs and estimated funding. These individual projects are presented in greater detail and discussed more extensively within this report.

Planning documents should be reviewed to see if the assumptions that were made are still applicable, at least every 5 years is a normal recommendation. Unanticipated events, such as an industry locating in the planning area, major subdivision construction in the planning area, a population increase much greater than projected and/or a population decrease in the planning area may cause the projections and conclusions to be invalid. A pandemic was not anticipated when the State Data Center made their projections of population for 2020 and beyond.

**Funding for 0-2-year Proposed Projects**

The District proposes to fund the two projects in the 0-2-year planning period as shown in Table 1-1 located in the appendix to this document (Section 1-3). Project 0-2A Boone Village Subdivision project has been approved by the Division of Water (DOW) and will be under construction soon. Appendix 1 Section 1-4 contains the Completeness and Adequacy approval letter dated October 8th, 2020. Also found in Appendix 1, located in Section 1-5 is the September 11, 2020 letter of Findings of No Significant Impact and Environmental Assessment

Project 0-2A Boone Village Subdivision sewers ($928,000. Opinion of probable project costs) will be funded with a KIA Fund A Loan commitment (A20-049, SX 21151022) of $730,000 (2.50% interest for 20 years plus an administrative fee of 0.2%) which results in an annual payment of $48,605. The balance of the cost, $198,000 will be contributed from local funds by NMCCD.

If we assume that each of the 70 (69 residential and one commercial) new customers are billed for 4,000 gals/month, based on the District's current rate schedule attached in Appendix Section 1-1, that will generate $61.49/customer/month, $4,304/month (slightly more due to the one commercial customer) or $51,648/year or more than the required KIA debt service. The residential rate for 4,000 gallons is $61.49 per month. The commercial rate for that same amount is $65.95 per month.

Project 0-2B Boone Trace WWTP to Battlefield WWTP Site (estimated at $150,000 cost). The steel package treatment unit from Boone's Trace will be installed parallel and next to the existing steel package treatment unit. An application for the capacity increase is at DOW awaiting approval. This work would be accomplished by using District employees to do as much work as they can on this rehabilitation project. Beyond the work the District can do internally, the District would use funds from tap-on fees and the balance from the general fund account to pay for any contract work that they have to sub out. By doing this the District will keep the funds paid out for this project to a minimum.

The WWTP is being expanded to handle the increased flow rate from Twin Lakes subdivision and other undeveloped land in the area. The plant does not have any compliance issues, but these additional areas will create a capacity problem. The plant is now operating at approvimately 64% of it's design capacity. After adding the flow from Twin Lakes, without an expansion the plant would be operating at 90% design capacity. This expansion will increase the capacity of the plant for handling the anticipated added wastewater flow.

Projection of probable costs out in the future 3 years and beyond becomes very subjective. Material costs, labor costs and possible funding scenarios (numerous agencies and various grant to loan percentages) cannot be predicted with any certainty and therefore are only shown in Table 1-1 for reference. The District's goal is for each project to be self-sustaining as is Boone Village with a small amount of local fund infusion.

## Section 2 – Statement of Purpose and Need

There are four triggers listed in the KY Division of Water's (DOW) June 2019 Guidance Document per 401 KAR 5.006 that are listed which result in the need for an update to an entity's Regional Facilities Plan (RFP). Briefly, those are;

1). Formation of a new Regional Planning Agency,

2). Construction of a new Wastewater Treatment Plant (WWTP) in an existing Planning Area (PA),

3). Increasing the average daily design capacity, of an existing WWTP, by more than 30% and

4) increasing the number of customers (or customer equivalents) served by more than 30%.

In the case of Northern Madison County Sanitation District (NMCSD), the 3rd trigger is the one that causes the need to update this RFP. Even though an RFP is a look into the future at the estimated 20-year wastewater needs of a PA, it is prudent to revisit the existing plan every 5-10 years to evaluate how the projections and estimates are tracking. NMCSD's existing RFP is in the range of 8 years old and thus nearing the end of the period when the plan should be revisited.

NMCSD currently operates four WWTP's with the rated Design Capacity, 2019 Average Flow, Reserve Capacity, and the Average Flow Per Customer shown in Table 2-1 below.

**Table 2-1**
**Current Wastewater Treatment Plant Flow Data**

| Wastewater Treatment Plan Name | Design Capacity (GPD) | 2019 Average Flow (GPD) * | Treatment Reserve Capacity (GPD) | Total 2019 Customers Served | Average Flow Per Customer (gal/customer/day) |
|---|---|---|---|---|---|
| **Regional -Jacks Creek** | 1,000,000 | 240,000 | 760,000 | 1023 | 234 |
| **Muddy Creek (MC)** | 200,000 | 75,000 | 125,000 | 400 | 188 |
| **Battlefield (BF)** | 114,000 | 73,000 | 41,000 | 482 | 151 |
| **Executive Park (EP)** | 30,000 | 11,000 | 19,000 | 75 | 147 |
| Totals | **1,344,000** | **399,000** | **945,000** | **1980** | **202** |

Note: * Info taken from operator's annual flow data.

### Upgrade of Battlefield WWTP

Within the Battlefield WWTP (BF WWTP) service area there is a major expansion planned to an existing subdivision with approximately 125 proposed new lots. This subdivision, Twin Lakes, will be constructed in phases. When totally built out, using a more conservative value of

contribution per household of 250 gal/customer/day, would produce approx. 31,250 GPD (250 gal/household/day x 125 lots). This additional flow would cause the BF WWTP to be near the rated design capacity (~95%). NMCSD has a plan to increase the capacity of the BF plant to be ready to accept this flow from this proposed subdivision addition. They currently have the Boones Trace package WWTP, a 100,000 GPD decommissioned plant that was removed from service when a pump station was installed in its location to pump the flow from that plant location to the Regional Plant for treatment. Plans are to recondition, i.e. sandblast and repaint and relocate this plant to BF WWTP site and install it as a parallel train with the existing treatment units (train). This would increase the design capacity at the BF location to 214,000 GPD (114,000 existing + 100,000 added flow). With this additional capacity, the average daily flow, including the total buildout of the Twin Lakes subdivision expansion, would be approx. 51% of the total increased treatment capacity.

Future flow to this plant would come from the Kingston area which has an elementary school package plant and some other smaller subdivisions. Later, if the Executive Park plant was deemed to be taken out of service (decommissioned), that flow could then be pumped to the BF WWTP. There are also some rural areas of undeveloped land within the BF service area.

**Install New WWTP West of I-75**

There is a lot of undeveloped land west of I-75 that is poised for development. The District proposes to build a 114,000 GPD package WWTP in the 3 to 10-year time frame to service this area, if it develops as currently anticipated. The plant would be very similar to the BF WWTP plant in design and construction. This would foster efficiency in operations due to the District personnel being already familiar with the operation of the BF WWTP.

Another driving force for development in this area is the KY Transportation Cabinet's (KYTC) planned improvements to KY 52 which include upgrading this road and connecting it to the newly built Duncannon Rd. Exit (83) at I-75. The KYTC also has plans to upgrade a number of connector roads in this area. Improved roadways and easy access to I-75 may not only spur residential growth but could also spur commercial/industrial growth in this area. A copy of the Kentucky FY 2020-2026 Recommended Highway Plan dated January 2020, pages that pertain to Madison County are included in Section 2-1 of the Appendix.

Another spur for possible growth in this area is the County declaring the area west of I-75 being an Opportunity Zone. This designation makes it easier for Companies to obtain low interest loans or grants to build in this area. Below is an excerpt from the Build 2020 Grant Document Plan for this area.

Excerpt from the Build 2020 Grant Documentation (see Cover in Appendix Section 2-2).

Related to straightening of KY 52 and rerouting it to connect to the new Duncannon Rd. exit at I-75.

“The Project is within a rural area and an opportunity zone, based on the U.S. Census designation. The area is a crucial travel corridor, connecting destinations and employment centers in Lancaster, Richmond, Eastern Kentucky University, Berea, the Airport, and Bluegrass Army Depot. KY-52 is also a planned destination for businesses and visitors to the county, and an area targeted for much needed economic development and revitalization. The purpose of the Project is to provide better system linkage, and improve safety, reliability and travel times while addressing deficient horizontal and vertical curves and sight distance along KY52 between Wallace Mill Road and I-75. The Project seeks to improve east to west connectivity between US-27 and I-75 and enhance the transportation network in Garrard and Madison Counties.”

As stated, this area is rural and currently used as farmland. For the purpose of wastewater flow projection in this area, we have assumed that these road improvements will create an opportunity for residential, commercial and industrial development. We have assumed that there may be two large subdivisions of 100 acres each. One of them will have 1 acre lots. If 10% of the area is set aside for roads and open spaces that would result in 90 new homes. The second subdivision would also have 10% allocated for streets and open spaces but have homes located on ¾ acre lots and therefore would result in 120 new homes. This total of 210 new homes with an average of 2.5 people/household would then generate 52,500 GPD.

Also assuming 2 commercial establishments such as convenience stores with bathrooms for customers (12 month average flow numbers from Moberly Shell and Bybee Quick Stop as shown in Section 7) and 2 industries with 50 employees each would add another (900 GPD + 700 GPD plus (2 industries x 50 employees x 20 g/day/employee) = 2,000 GPD) = 3,600 GPD for a total average day of 56,100 GPD when combined with the total projected residential flow estimate. Therefore, a package WWTP with a design capacity of 114,000 GPD (similar to the Battlefield package WWTP) is recommended to be installed west of I-75 at an available site next to Silver Creek.

As and if development in this area west of I-75 continues then this plant could be relocated downstream and a parallel train could be installed to accommodate the future flow. The prior property location could then be the site of a pump station as necessary.

# Section 3 – Physical Characteristics of the Planning Area

## Planning Area General Information

Madison County has a land area of 283,520 acres and presently has three distinct Wastewater Planning Areas (PA). NMCSD's existing areas encompass 88,798 acres, while the City of Richmond's PA and Berea's PA each have 35,787 and 13,769 acres respectively. The US Government has a large weapons storage and disposal facility/military base, Blue Grass Army Depot (BGAD), consisting of 11,924 acres in the southeastern part of the county. The drawing DWG 3-1 – General Planning Area Map (located in Appendix Section 3) pinpoints the PA's and the BGAD. NMCSD will add some 71,734 acres (this area is shown in yellow on DWG 3-1) to their existing PA This drawing also includes Madison County boundary and the current corporate boundaries and service areas for both Richmond and Berea as well as an outline of the US Army Depot. The PA's limits have been provided in electronic format and are included with this report.

NMCSD's PA is roughly the shape of a doughnut north of Richmond's PA to the KY River, the border with Fayette County, on the east and west of Richmond's PA and north of Berea's PA. NMCSD's largest portion of their PA is located in the northern part of Madison Co. and stretches from the County's eastern border with Estill County and generally north and south of KY 52 east of the BGAD to the NMCSD PA south of Richmond to the Terrell area. The area to be added to NMCSD's PA lies south of KY 52 bounded by the BGAD and the Terrell area until it crosses I-75. This new PA also extends west of I-75 to the west and north bounded by the western watershed divide of silver creek and the western limit of Richmond's PA to the east until it joins back to the existing NMCSD PA in the north.

The areas that have already been provided sewer service within the NMCSD's PA are shown on DWG 3-1. The serviced areas consist of subdivision developments in the county. The NMCSD Regional Wastewater Treatment Plant (WWTP) or the Muddy Creek WWTP provides the treatment for areas that have been provided sewer service in the Northern and Eastern Regions of the County.

The region of the PA located south of the City of Richmond and south west of the Army Depot currently is centered on a triangle formed by US highways 25 and US 421. The bottom of this triangle is either Berea's service area or a watershed divide. This triangle and its surrounding area form the southern region of the existing NMCSD PA (See DWG 3-1). This region has two proposed subdivisions (Twin Lakes and New Kingston) and presently services (Executive Park, Battlefield Estates and Terrill) subdivisions by the Battlefield WWTP and the Executive Park WWTP (See DWG 9-5 for overview of these areas).

The proposed projects within the 20-year planning period are distributed in the PA. Table 3-1, below, labels the projects by Planning Period, Project Number and Description. The location of each project is shown on DWG 3-1 and on the detailed 11x17 sheets associated with each project.

**Table 3-1**

**Proposed Projects During Each Planning Period**

| Planning Period | Project Number | Project Description |
|---|---|---|
| ***0-2 years*** | 0-2A | Boone Village Subdivision |
| ***(Years 2020-2022)*** | 0-2B | Boone's Trace WWTP to Battlefield WWTP site |
| | | |
| ***3 – 10 years*** | 3-10A | Rehab Madison Village Sewer System |
| ***(Years 2023-2030)*** | 3-10B | Connect Moberly Shell, decommission WWTP |
| | 3-10C | Extend Sewer to Waco Elem., decommission WWTP |
| | 3-10D | Extend Sewer to Shady Hills Subdivision |
| | 3-10E | WWTP & Collection System West of I-75 |
| | | |
| ***11-20 years*** | 11-20A | Extend Sewer to Bybee Quick Stop, decommission WWTP |
| ***(Years 2031-2040)*** | 11-20B | Extend Sewer to Kingston Elem. Sch., decommission WWTP |
| | 11-20C | Install Pump Sta. at Executive Park, decommission WWTP |
| | 11-20D | Battlefield WWTP Design & Construct Capacity Increase |
| | 11-20E | Regional WWTP Design Capacity Increase |
| | 11-20F | Exit 97 – Extend Sewer to Simpson Lane |

**Description of Each Project in Planning Period 0-2 Years**

This RFP has the proposed Project #0-2A - Boone Village Subdivision Sewer Project to be constructed in the 0-2-year planning period. This proposed project will bring sewer collection and treatment to an established subdivision in which the lots are small and steep for individual septic tanks and lateral lines (see DWG 3-2). Some of the onsite systems are failing and the subdivision has been designed for a gravity sewer collection system and a single pump station/force main to service the total developed area of the subdivision.

The second proposed project in the 0-2-year planning period is Project #0-2B – Increase Battlefield Estates WWTP Capacity (see DWG 3-3). This project will rehabilitate and relocate an existing package treatment plant that has been taken out of service in the Boone's Trace area, moved and placed back in service to increase the treatment capacity at the Battlefield WWTP.

The current design capacity of the Battlefield WWTP is 0.114 million gallons per day (MGD). The repurposed Boone's Trace unit will be placed next to the existing Battlefield plant and allow for increased treatment capacity at that plant site. This will be done to increase the capacity of that plant in order to accommodate a proposed and phased 125 lot subdivision expansion, i.e. Twin Lakes.

**Description of Projects in Planning Period 3-10 Years**

In the 3 to 10-year planning phase, there are 5 projects proposed. The first is the Project #3-10A - Rehab of the Madison Village Existing Sewer System shown on drawing DWG 3-4 (located in Appendix Section 3). This subdivision was initially a Homeowner's Association system built in the late 1960's with a package treatment plant. It was the first area/system that was incorporated into the NMCSD when it was formed in June of 1996. Due to the age of the system and the use of clay pipe, this area has issues with Inflow & Infiltration (I&I). This project is envisioned to replace the existing gravity and force main sewer system within the subdivision with a new and upgraded system. The current sewers have been inspected by video and need replacement instead of repairs. The new system will eliminate 1 pump station (PS#1) and upgrade PS#2 and PS#3 with more efficient pumps/motors(see DWG 3-4).

Two additional proposed projects in the 3-10-year planning period will entail the removal of package treatment plants by connecting them to NMCSD's existing sewer system. Drawing DWG 3-5 provides details to Project #3-10B – Connect Sewer to Moberly Shell and Decommission WWTP. Drawing DWG 3-6 shows Project #3-10C – Extend Sewer to Waco Elementary School, Decommission WWTP. The proposed connections for these projects will eliminate two (2) privately owned and operated package treatment plants.

The next project in this planning period is shown on drawing DWG 3-7 titled Extend Sewer to Shady Hills Subdivision. This project will extend service to an existing subdivision by the addition of 2 pump stations, gravity sewers and a force main. It is proposed to be constructed in the 3-10-year planning period.

The last project listed in the 3-10-year planning period is project #3-10E and envisions a new package WWTP west of I-75. As the name entails the project is to be west of I-75 and will be located near new developments associated with the proposed Kentucky Transportation Cabinet (KYTC) highway improvement projects Items #7-8853.00 and 7-235.00. This proposed new WWTP will be located next to Silver Creek and serve residential, commercial and industrial as a result of the highway relocations and the benefit of locating in an Opportunity Zone. The KYTC projects, as well as a proposed location for Project 3-10E within the new Opportunity Zone are shown on DWG 3-1. A detail land use and flood zone drawing have not been included in this report because of the lack of known details.

**Description of the Projects in Planning Period 11-20 Years**

This 11 to 20-year planning period will see 6 additional proposed projects. Three of these projects will remove package treatment plants and two others will involve the engineering

investigative study of the need to increase the design treatment capacity of two major existing treatment plants (Regional and Muddy Creek). The sixth project provides wastewater services across Interstate 75 near Exit 97.

Drawing DWG 3-8 details the Project #11-20A – Extend Sewer to Bybee Grocery, Decommission WWTP. Drawing DWG 3-9 shows the proposed Project #11-20B – Extend Sewer to Kingston Elementary, Decommission WWTP. These two projects will each remove a privately owned and operated package treatment plant and extend sewer services to the District's existing collection system by means of a pump station and force main. There are also some small residential areas/subdivisions in these areas that could be served by this project.

Drawing DWG 3-10 indicates Project 11-20C – Increase Executive Park WWTP Capacity or Pump to Battlefield WWTP (BF WWTP). This project will be to evaluate the need to expand/rehab the existing Executive Park WWTP, currently at a design capacity of 0.030 MGD versus replacing this plant with a pump station and force main to transport the flow to the BF WWTP.

Project 11-20D – Battlefield WWTP Design & Construction Capacity Increase is proposed for the 11 to 20-year planning period. This plant is shown on Drawing DWG 3-3 and has been expanded once (Year 0-2, Project 0-2B) to incorporate the refurbished package plant from Boone's Trace. The design capacity of the Battlefield plant after Project 0-2B will be 0.214 MGD. This project will investigate the need to expand that design capacity even more to service the potential growth of additional subdivisions south and east of the plant.

The location of Project 11-20E – Regional WWTP Design Capacity Increase Study location is shown on drawing DWG 3-11. This plant currently has a design capacity of 1.0 MGD. As this region develops and sewer service is extended to new and existing subdivisions, this plant will need to be evaluated to determine if an expansion is needed.

The location of Project 11-20F – Extend Sewer to Simpson Lane is shown on DWG 3-12 (again located in Appendix Section 3). This proposed project consists of constructing a gravity sewer flowing east from I-75 to a proposed pump station at the intersection of Igo Road and Simpson Lane. This pump station will then pump wastewater back up Igo Road on a parallel route to the gravity line and then cross under Interstate I-75 to connect to the existing Exit 97 Pump Station as shown.

**Water Sources in the Planning Area**

In general, the watershed boundaries in the county are outlined on drawing DWG 3-1. This drawing has a United States Geology Survey (USGS) base map that show roads and surface features as well as contours for the entire county and beyond. Drawings DWG 3-2 through DWG 3-12 show the delineation of the 100-year floodplain from the Federal Emergency Management Administration's (FEMA) web site as they appear nearby each of these proposed projects.

The drawing DWG 3-13 locates the public drinking water intakes within each of the PA's. This same drawing indicates existing Source Water Area Protection Plan (SWAPP) zones and the Wellhead Protections Areas (WHPA). The SWAPP have been divided into three protective zones; Zone 1, 2, and 3. These zones are defined on a minimum distance upstream of the intake and into the watershed. Zone 1 is defined as the Critical Zone and begins ¼ mile below the intake and extends 5 miles upstream of the intake along the stream and included ¼ mile on each side of the streams. Zone 2 is called the Zone of Responsibility and extends to 10 miles above the intake and along the source stream and tributaries. Zone 3 extends to 25 miles above the intake. While no WHPA's have been defined in Madison County, one public well is noted on the drawing.

**Local Planning and Zoning Land Use**

Drawings DWG 3-2 through 3-12 detail the current status of the Official Zoning map from Madison County, KY. Overlaid on each of these zoning maps is the sketch of the proposed projects within NMCSD's PA. As these drawings indicate, the majority of the PA is comprised of agricultural areas with intermingled single-family subdivisions and some minor general Commercial areas included. The very southern portion of the PA east of I-75 has been more heavily developed with single family residential areas and commercial developments.

## Section 4 - Socioeconomic Characteristics of the Planning Area

### Historical and Current Population

The NMCSD planning area largely serves as bedroom communities for the nearby cities of Richmond and Berea in Madison County as well as Lexington and Georgetown north of Madison County. In the last 50 years, the population growth of Madison County has been substantially greater than that of Kentucky. The presence of numerous small to moderately sized residential developments throughout the planning area support that data.
Table 4-1 summarizes census data from the Kentucky State Data Center (KSDC) at the University of Louisville (Total Population 1900-2010) that confirms this increase in population.

**Table 4-1**
**Historical Population Data, Kentucky and Madison County (from KSDC)**

| | 1960 | 1970 | 1980 | 1990 | 2000 | 2010 |
|---|---|---|---|---|---|---|
| **Kentucky** | 3,038,156 | 3,218,706 | 3,660,777 | 3,685,296 | 4,041,769 | 4,339,367 |
| Total % increase since 1960 | | 5.9% | 20.5% | 21.3% | 33.0% | 42.8% |
| Avg. annual % increase in previous 10 years | | 0.6% | 1.4% | 0.1% | 1.0% | 0.7% |
| **Madison County** | 33,482 | 42,730 | 53,352 | 57,508 | 70,872 | 82,916 |
| Total % increase since 1960 | | 27.6% | 59.3% | 71.8% | 111.7% | 147.6% |
| Avg. annual % increase in previous 10 years | | 2.8% | 2.5% | 0.8% | 2.3% | 1.7% |

As table 4-1 indicates Madison County has been growing much faster than the state in general. When looking at the total increase over the 50 years displayed, the county's population has grown approximately three times faster than the rest of the state.

Looking at the demographics of Madison County, we see a division between the rural population in the county and the two larger population centers of Richmond and Berea. This rural area is the focus of the Northern Madison County Sanitation District service area. We see in Table 4-2 a very consistent percentage increase of rural vs urban residents over the last 40 years. The percentage breakdown ranges from 44% to 48%, rural vs urban. See Chart 4-1 located in Appendix Section 4-1, which presents this information in graphic form.

**Table 4-2**
**Historical Population Centers Data within Madison County (from KSDC- US Census)**

| | 1980 | 1990 | 2000 | 2010 |
|---|---|---|---|---|
| **Madison Co. Population** | 53,352 | 57,508 | 70,872 | 82,916 |
| **Richmond Population** | 21,705 | 21,155 | 27,152 | 31,364 |
| **Berea Population** | 8,226 | 9,126 | 9,851 | 13,561 |
| **Madison Co. – (Rich. & Berea)** | 23,421 | 27,227 | 33,869 | 37,991 |
| Rural % of Total | 44% | 47% | 48% | 46% |

The rural percentage appears to be consistent and can be used for continued projection of future data. We will use a 46% rural population percentage of the total population in the county to project the ratio of city (Richmond and Berea) populations to rural population within the county. This projection is in Table 4-4 Projected Population Centers within Madison County shown later in the body of this report.

**Current and Projected Population**

The planning areas have many large open areas of gently sloping farmland, easily adaptable for development. The northern portion of the PA spans the northern portion of the County from KY52, in the eastern part of the county north and in the area between Richmond and the northern border of the county, the KY River. North across the river is Fayette Co. and approx. 20 miles north of the river lays the urban population center of Lexington.

The developed southern portion of the PA is generally included in the triangle formed by US 25 and US 421, between Richmond and Berea to approximately Crooksville Road and/or Hayes Branch watershed divide. US 421 is a heavily traveled road between the two cities and forms the western border of the Bluegrass Army Depot (BGAD), which is a significant employer in the region. There are already numerous residential developments along these two corridors. West and southwest of Richmond there is a lot of rural areas that may be developed in the future.

Another factor that may support increased residential and commercial growth in the region is the completion of Exit 83 on Interstate 75 a few years ago. This exit feeds onto KY2872 (Duncannon Lane), which is a direct four-mile link between the interstate and the BGAD. The Kentucky Transportation Cabinet (KYTC) also has planned improvements to KY 52 which will be realigned to connect to this new interchange in their 6-year highway improvements plan (see the Appendix Section 2-1 for select pages from the KYTC 6-year plan). Improved/upgraded roads tend to foster residential, commercial and even industrial development. This area is a part of a larger Opportunity Zone west of I-75.

Table 4-3 summarizes projected population data provided by the KSDC, vintage 2016. The annual 1.7% increase shown in Table 4-1 in Madison County population over the past 10 years is consistent with the conservative future projection that range from 0.9% to 1.2% per year that was used by the data center to project growth over the next 30 years. Compared to the previous 50-year period, these projections appear to be very conservative. Given the uncertainty of the current COVID-19 virus these projections could change.

Note that Table 4-3 indicates the household size is on a steady decline, which would lower the amount of flow contribution from each house.

**Table 4-3**
**Projected Population Data, Kentucky and Madison County (from KSDC)**

| | Census | Projections | | | | | |
|---|---|---|---|---|---|---|---|
| | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 |
| **Kentucky Total Population** | 4,339,367 | 4,425,092 | 4,533,464 | 4,634,415 | 4,726,382 | 4,808,682 | 4,886,381 |
| total % increase since 2010 | | 2.0% | 4.5% | 6.8% | 8.9% | 10.8% | 12.6% |
| avg. annual % increase since 2010 | | 0.4% | 0.4% | 0.5% | 0.4% | 0.4% | 0.4% |
| Population in Households | 4,213,497 | 4,296,273 | 4,402,331 | 4,500,930 | 4,590,504 | 4,670,372 | 4,745,599 |
| Total Households | 1,719,965 | 1,783,261 | 1,850,203 | 1,911,228 | 1,967,242 | 2,016,732 | 2,061,430 |
| Average Household Size | 2.45 | 2.41 | 2.38 | 2.35 | 2.33 | 2.32 | 2.30 |
| | | | | | | | |
| **Madison County Population** | 82,916 | 87,824 | 91,774 | 95,773 | 99,688 | 103,064 | 106,301 |
| total % increase since 2010 | | 5.9% | 10.7% | 15.5% | 20.2% | 24.3% | 28.2% |
| avg. annual % increase since 2010 | | 1.2% | 1.1% | 1.0% | 1.0% | 1.0% | 0.9% |
| Population in Households | 77,221 | 82,070 | 85,908 | 89,793 | 93,592 | 96,846 | 99,966 |
| Total Households | 31,973 | 34,248 | 36,529 | 38,793 | 40,932 | 42,829 | 44,600 |
| Average Household Size | 2.42 | 2.40 | 2.35 | 2.31 | 2.29 | 2.26 | 2.24 |

From the projected population data from the KSDC, Vintage 2016 we get the projected total population for Madison County. Applying the average percentage of Rural residents to the Total

Population projections of the county, the results on the interpolated data are shown in Table 4-4. Madison County population minus the population of the cities of Richmond and Berea data is shown on the "Calculated Rural Madison Co.- (w/o Richmond & Berea)" line on Table 4-4. The KSDC does not project City populations, but this seems to be a reasonable estimate of the rural population growth as it parallels the total county's population growth. As Table 4-2 calculates the Rural Population is very consistently at 44-48% of the total population of the county. We will use an average number of 46% to project the future growth of population and households of the rural areas in the county for the next twenty years in Table 4-4.

**Table 4-4**
**Projected Population Centers within Madison County (from KSDC)**

| | 2020 | 2025 | 2030 | 2035 | 2040 |
|---|---|---|---|---|---|
| **Madison Co. Population** | 91,774 | 95,773 | 99,688 | 103,064 | 106,301 |
| Projected Rural % of Total | 46% | 46% | 46% | 46% | 46% |
| **Calculated Rural Madison Co. – (w/o Richmond & Berea)** | 42,216 | 44,056 | 45,856 | 47,409 | 48,898 |
| Projected Average Household Size | 2.35 | 2.31 | 2.29 | 2.26 | 2.24 |
| Projected Number of Households | 17,964 | 19,072 | 20,025 | 20,978 | 21,829 |
| Projected Increase in Households over 2020 | | 1,107 | 2,060 | 3,013 | 3,865 |

As Table 4-4 indicates the future growth of the rural households for the entire county for the next 20 years could be at an approximate rate of 1,000 households per 5-year period. A good portion of this growth will be within the PA, which does not include rural areas south Berea and on the extreme west edge of the county. This growth will in part be enabled by access to quality rural services including sanitary sewer services that Northern Madison County Sanitation District will be willing and ready to provide. This increase population for the rural portion of the county is indicative of an increase in the households that the District will serve as the two groups should increase in parallel.

A second method of predicting future customer numbers is to look at the number of historical and current customers of the District (NMCSD) at the beginning of each of the last 10 years and project that forward to 2040. By utilizing this method, Chart 4-2 located in Appendix Section 4-2 indicates a projected customer base of 2,884. This chart trends the total number of customers for NMCSD over the last ten years to project the next twenty years into the future. This seems to verify the population trends presented in Table 4-4. Notice that in 2020 NMCSD had approx.

2000 customers or a little over 11% of the number of households in the rural area shown in Table 4-4. If that same percentage is applied to the 2040 household projection, that would result in approximately 2400 customers. For the purpose of this report this larger number, (approx. 3000) which would be more conservative, will be used as the number of future customers in 2040.

There are a multitude of factors that could affect these projected values in a positive manner or a negative manner, such as;

1. A City annexing some of the District's customer base or future service area.
2. A major industry locating in the District's service area.
3. A major employer leaving the area and the corresponding loss of employment reduce the residents desire to stay or build new homes in the PA.
4. A major housing boom resulting from pent up demand due to the Covid-19 virus.
5. Covid-19 decreasing the housing demand due to increased unemployment.
6. Planned highway improvements which lead to new residential, commercial and/or industrial developments.

**Current and Projected Industrial and Commercial Users**

The NMCSD's service areas are largely residential, with minor commercial facilities, such as gas stations, convenience stores, small businesses, churches and schools. There are no major industrial sites in the current service areas but west of I-75 there has been a large area designated as an Opportunity Zone. Opportunity Zones provide easier access to funding for industrial companies and would attract residential developments with easy access to improved roads and new employers in the area. Project 3-10E discusses future development possibilities in this Opportunity Zone including potential new commercial and industrial customers. This is discussed in Section 8 under the Industrial, Institutional and Commercial Flows heading.

**Economic and Social Impact**

The proposed projects could also stimulate the local economy by providing additional collection, transport and treatment capacity for residential growth. For example, the 0-2 Year Phase which includes providing sewer service to an existing subdivision of close to 69 homes and one commercial customer in the northern part of the PA. This flow would be collected and pumped to the District's Regional WWTP.

The 0-2 Year Phase would also include increasing the treatment capacity of the Battlefield WWTP (currently 0.114 MGD) by moving a decommissioned and refurbished plant, with a capacity of 0.100 MGD to the Battlefield site and installed in parallel with the current Battlefield plant. By almost doubling the treatment capacity of this plant, it will provide additional treatment reserve to accommodate the proposed Twin Lakes Subdivision planned addition south of the plant and to the west of US 25. This subdivision expansion will be built in phases and ultimately have 125 new home sites. The total buildout of this subdivision would equate to approx. 30,000

GPD (125 lots x 2.35 persons/household (from Table 4-4) x 100 gals/person/day = 29,375 GPD). The Battlefield WWTP receives an average of 77,000 GPD, and thus has limited capacity reserve currently (114,000 -77,000 = 37,000 GPD) for future growth without this capacity expansion. This expansion will increase the design treatment capacity to 214,000 gals/day.

**Median Household Incomes for the Area**

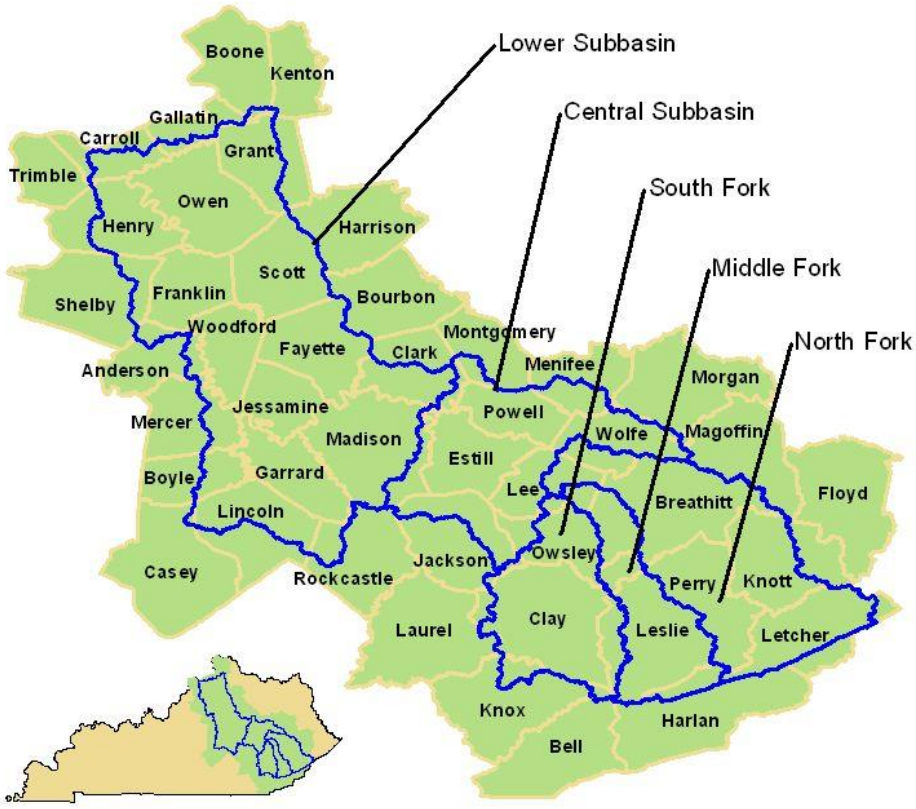
Finally, public sewers tend to increase property values, particularly when replacing failing septic systems. Furthermore, public sewer will improve the desirability of the area thus encouraging residential growth and the boost to the local economy that comes with it. The current median household income (MHI)(in 2018$) for Kentucky was $48,392 according to the US Census Bureau. That same web site lists the MHI for Richmond, Berea and Madison County as $34,532, $43,618 and $48,687 respectively.

## Existing Environment within the Planning Area

Surface Water Features and Quality

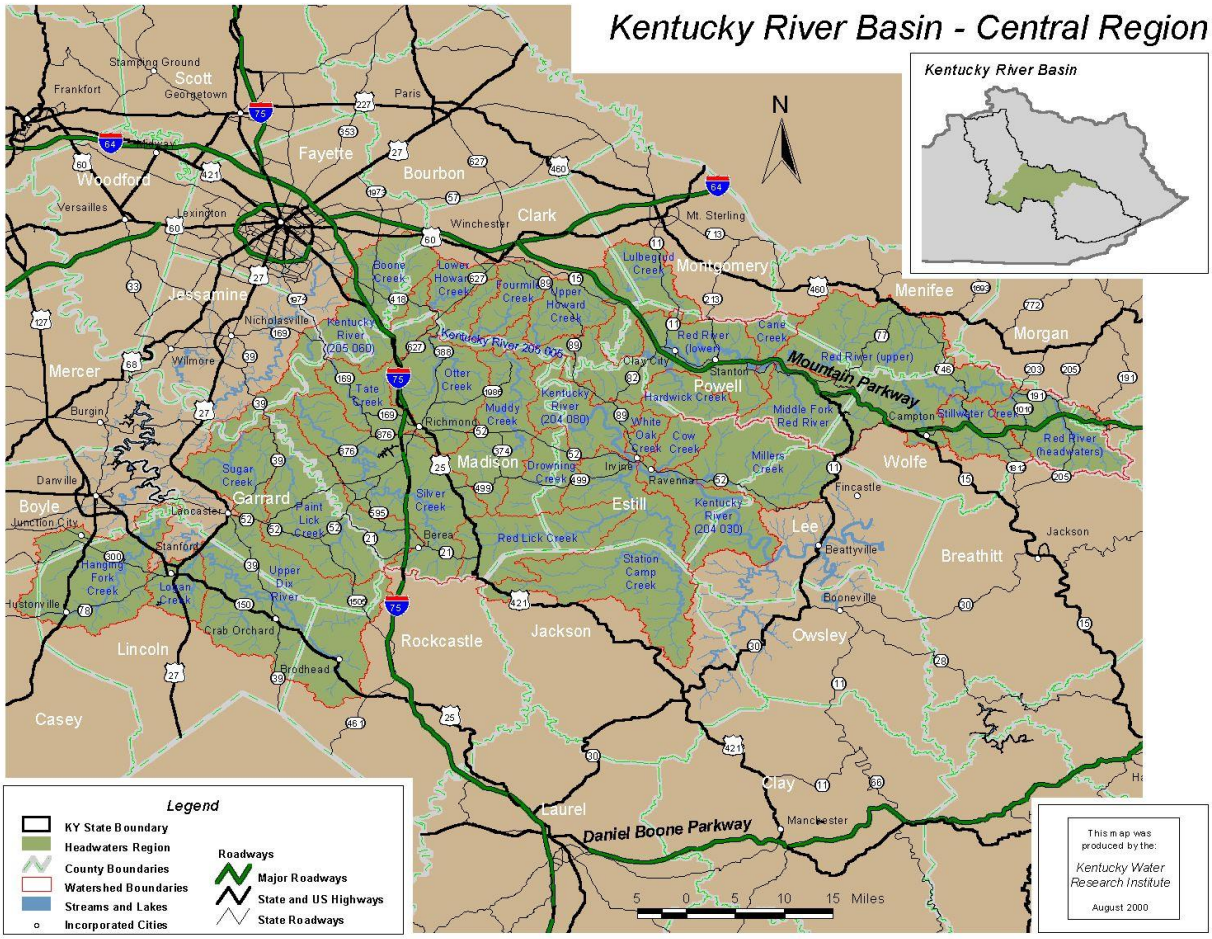
Madison County lies almost entirely in the Central Region of the Kentucky River Basin. The Kentucky River Basin Assessment Report (http://www.uky.edu/WaterResources/Watershed/KRB_AR/lower_subbasin.htm) produced by the Kentucky Water Research Institute (KWRI) (University of Kentucky), calls this the Lower Sub-basin of the KY River Basin (see Fig 5-1) . The Kentucky Division of Water's most recent Report to Congress under the Clean Water Act includes issues with this region that include straight pipes & failing septic systems.

**Figure 5-1 – Lower Sub-basin of the KY River Basin**



In general, this region is comprised of several sub-watersheds as illustrated by Figure 5-2. Specifically, the proposed projects are located within four different major sub-watersheds of the KY River Watershed basin.

**Figure 5-2 The Central Region of the KY River Basin**

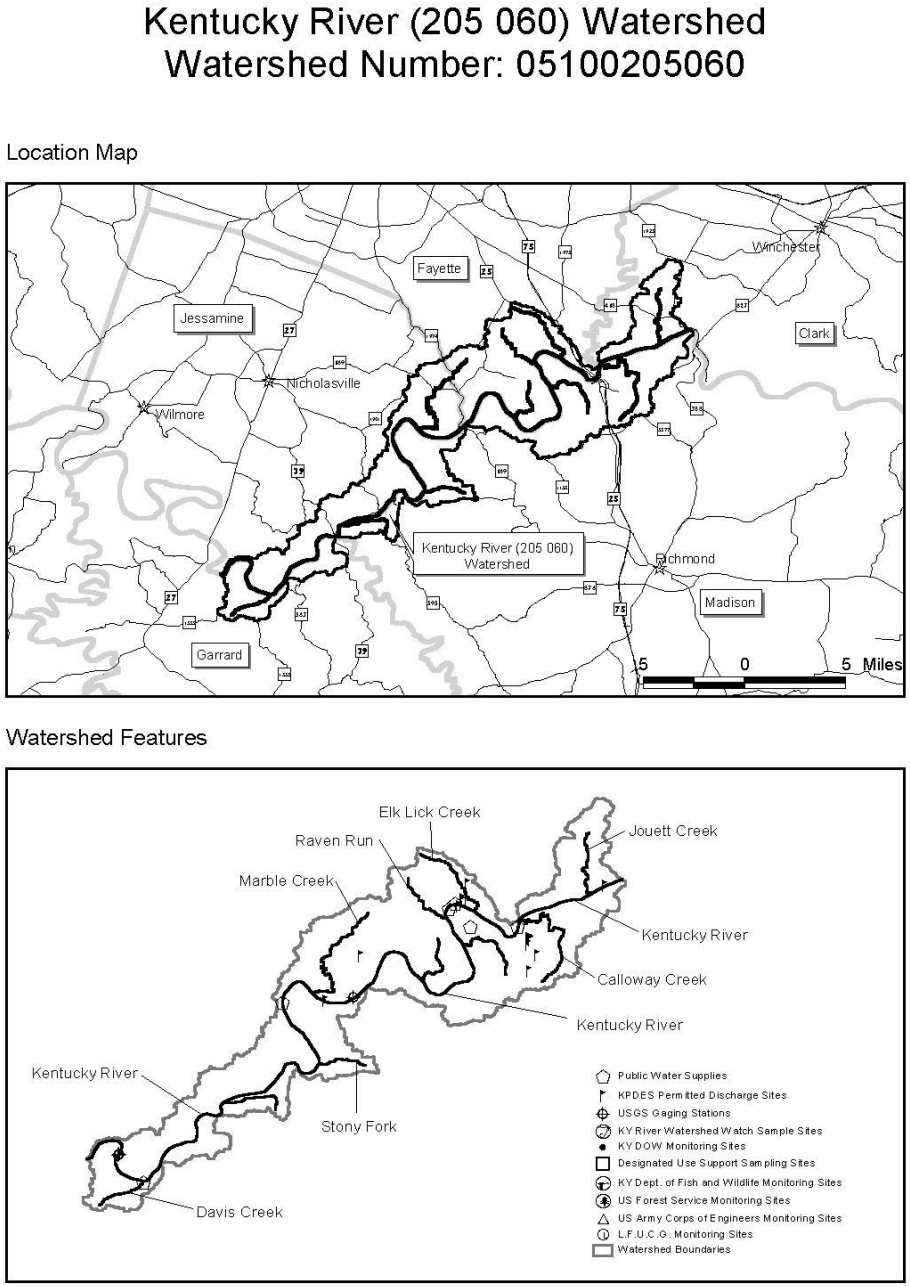



**Kentucky River 205 060 Watershed**

The NMCSD Regional WWTP (project #11-20E) and the Exit 97 Extension of sewer services to Simpson Lane (project #11-20F) are both located within what is called the KY River 205 060 watershed. According to the KWRI, the 11digit watershed number is 05100205060 (see watershed report located in Appendix Section 5-1). This watershed consists of 52,351 acres that has 67 percent Agricultural and over 30 percent are classified as Rural and Wooded Areas. This watershed has an overall watershed ranking of HIGH. This ranking was a combination of this watershed's HIGH ranking in "protection ranking", "observed impacts", "potential impacts" and "restoration rankings". This watershed contains 1,428 people not on a public sewer system.

Figure 5-3 below was taken from the KWRI report and shows the extent of the KY River 205 060 watershed.

**Figure 5-3 KY River (205 060) Watershed (from KWRI website)**

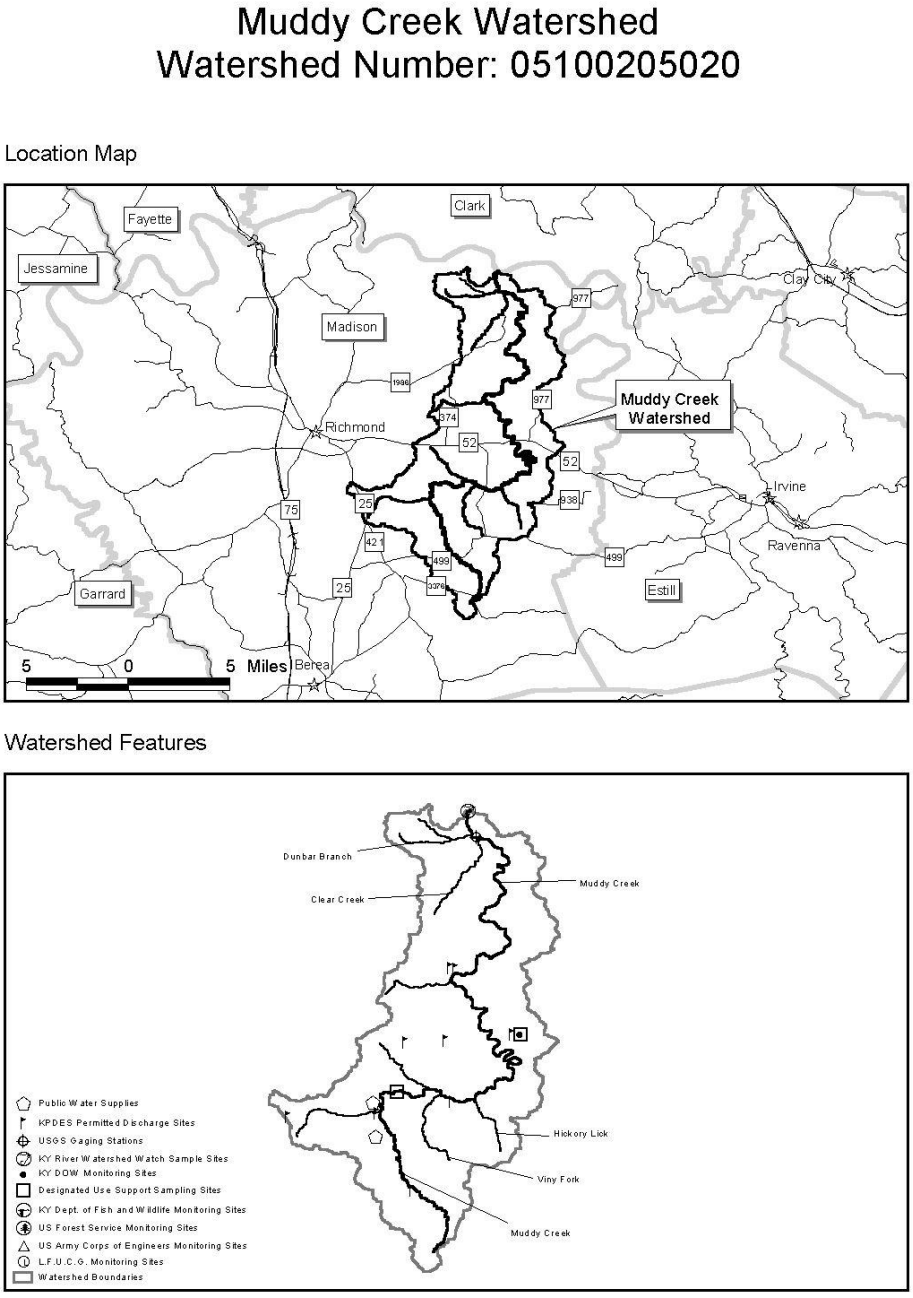



**Muddy Creek Watershed**

The ByBee Quick Stop (Project #11-20A), the Moberly Shell (Project #3-10B) and the Waco Elementary School (Project #3-10C) all discharge into the Muddy Creek Watershed. This watershed's 11-digit ID# is 05100205020 and consists of 43,491 acres which are 76 percent Agricultural, almost 11 percent Commercial and more than 9 percent classified as Rural and

Wooded Areas (see watershed report located in Appendix Section 5-2). This watershed has an overall watershed ranking of High. This ranking was a combination of this watershed's MEDIUM ranking in "protection ranking" and HIGH ranking in "observed impacts", "potential impacts" and "restoration rankings". This watershed contains 1,279 people not on a public sewer system. The 5-4 figure below was taken from the KWRI report and shows the extent of the Muddy Creek Watershed.

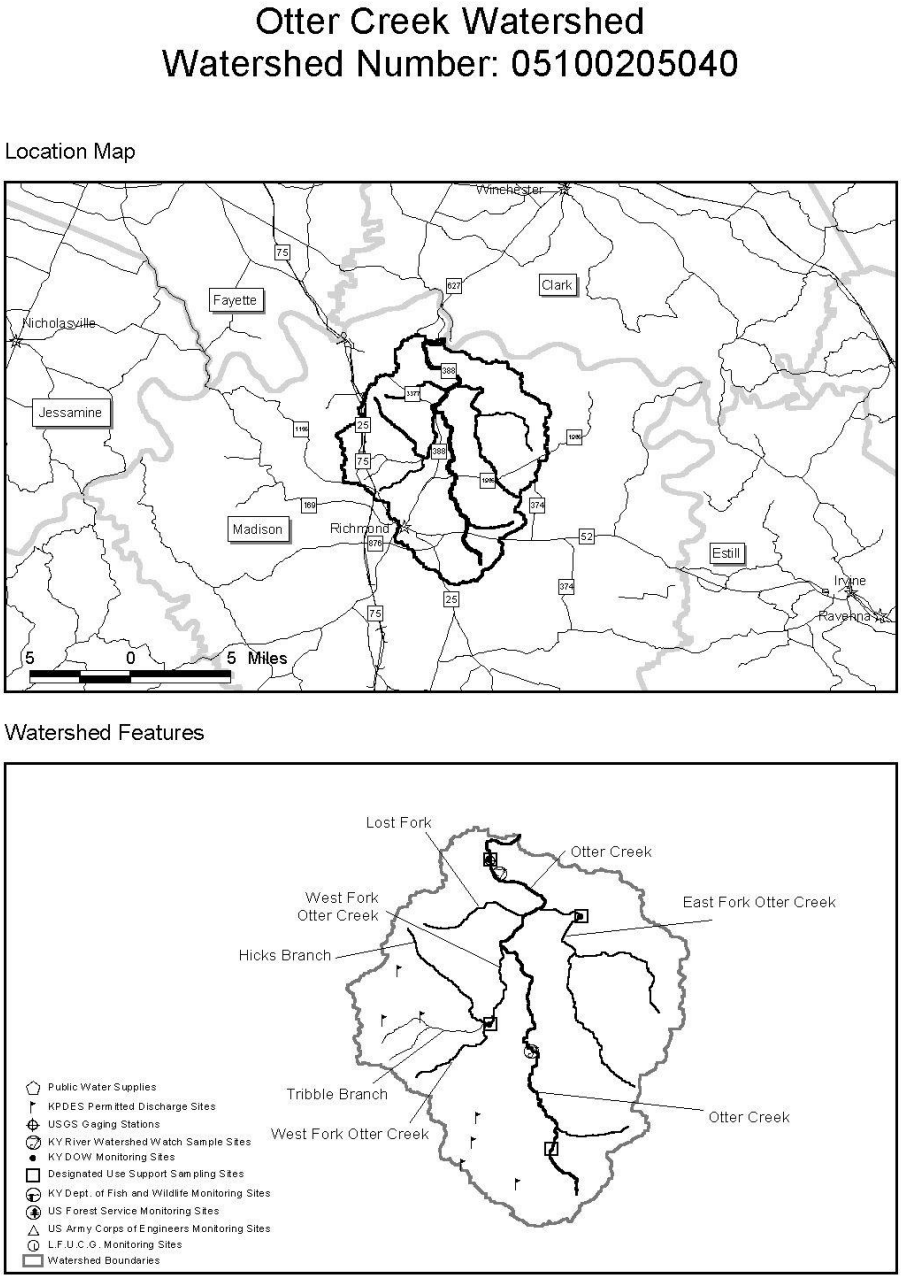
**Figure 5-4 Muddy Creek Watershed (from KWRI website)**



**Otter Creek Watershed**

The Madison Village subdivision (Project #3-10A), the Boone Village Subdivision (Project #0-2A) and the Shady Hill Subdivision (Project #3-10D) all discharge into the Otter Creek Watershed. This watershed's 11-digit ID# is 05100205040 (see watershed report located in Appendix Section 5-3) and consists of 41,832 acres which are 85 percent Agricultural, almost 6 percent Residential and 4 percent is classified as Rural and Wooded Areas. This watershed has an overall watershed ranking of LOW. This ranking was a combination of this watershed's LOW ranking in "protection ranking", MEDIUM ranking "observed impacts" and "restoration rankings" and HIGH ranking of "potential impacts". This watershed contains 1,344 people not on a public sewer system. The 5-5 figure below was taken from the KWRI report and shows the extent of the Otter Creek watershed.

**Figure 5-5 Otter Creek Watershed (from KWRI website)**




## Silver Creek Watershed

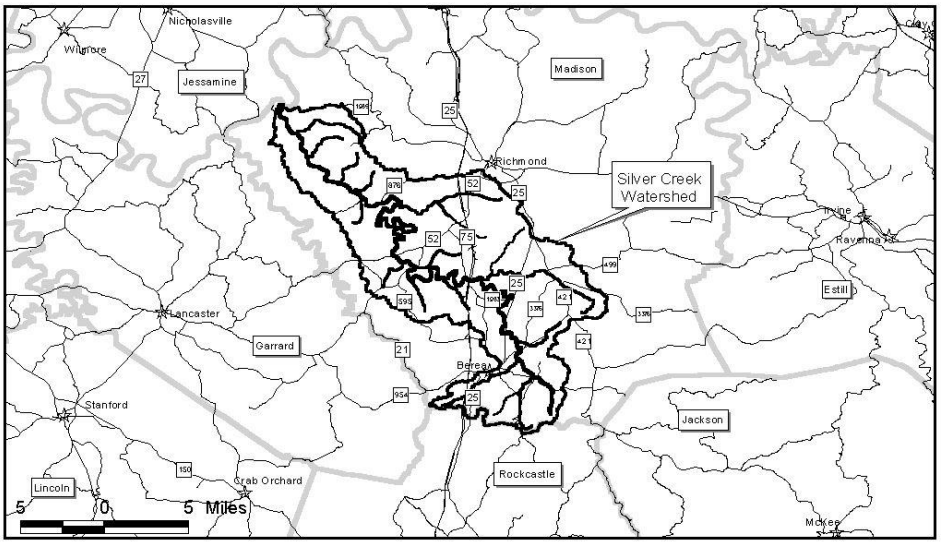
The Executive Park (Project #11-20C), the Battlefield WWTP (Projects #0-2B & #11-20D), the Kingston Elementary (Project #11-20B) and the Proposed WWTP West of I-75 (Project #3-10E) all discharge into the Silver Creek Watershed. This watershed's 11-digit ID# is 05100205090 (see watershed report located in Appendix Section 5-4) and consists of 80,540 acres which are over 77 percent Agricultural and over 14 percent is classified as Rural and Wooded Areas. This watershed has an overall watershed ranking MEDIUM. This ranking was a combination of this

watershed's MEDIUM ranking in "protection ranking", "observed impacts" and "restoration rankings" and HIGH ranking of "potential impacts". This watershed contains 2,858 people not on a public sewer system. The 5-6 figure below was taken from the KWRI report and shows the extent of the Silver Creek watershed.

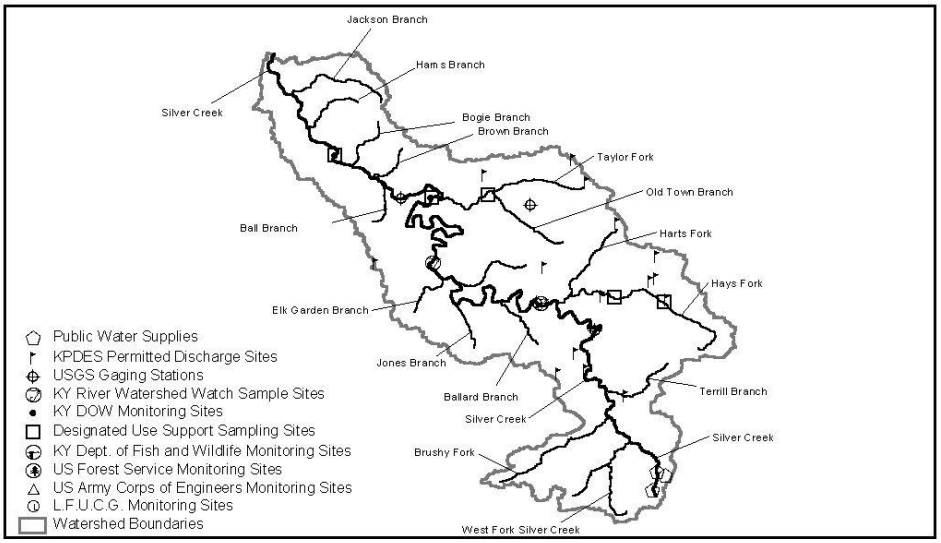
**Figure 5-6 Silver Creek Watershed (from KWRI)**

Silver Creek Watershed
Watershed Number: 05100205090

Location Map




Watershed Features



The Section 303(d) list of impaired waters contained in the 2016 Integrated Report to Congress on the Condition of Water Resources in Kentucky was accessed to determine if there are any impaired waterbodies in the vicinity of the proposed project areas. Section 303(d) is a part of the Clean Water Act and requires States to develop a list of waters not meeting water quality standards or which have impaired uses. These waters are identified as being impaired for one or more pollutants and do not meet one or more water quality standards. Impaired waters are identified through assessment and monitoring programs conducted by Kentucky Department of Water (KDOW) personnel, volunteer networks and other local, state and federal agencies. Causes of impairment include pathogens, siltation, flow alteration, turbidity, suspended solids, and low dissolved oxygen. The list contained in the 2016 report indicated that Otter Creek is only impaired water body in the vicinity of the proposed projects. The listing below includes the location that the impairment was detected by stream mile points shown in the parenthesis. The impairment is listed as the following:

- Otter Creek (0.0 to 2.9)
  - Water Body ID: KY500024_01
  - Pollutant: Fecal Coliform
- Otter Creek (0.0 to 10.7)
  - Water Body ID: KY500026_00
  - Pollutant: Fecal Coliform
- Otter Creek (0.0 to 4.1)
  - Water Body ID: KY500025_01
  - Pollutant: Escherichia Coli (E. Coli)

A Total Maximum Daily Load (TMDL) are under development for this watershed.

When discussing the entire Ky River Basin watershed, the report states “An increase in the proportion of impaired sites to supporting sites has been observed since 2006 in this BMU” referring to the Kentucky River Basin Management Unit (BMU).

**Groundwater Quality**

In Madison County, groundwater is hard to very hard and may contain salt or hydrogen sulfide, especially at depths greater than 100 feet. Salt water is found below fresh groundwater at variable depths throughout the entire state of Kentucky. Depths to the saline groundwater range from 50 feet or less down to 2,000 feet below land surface in Kentucky. In Madison County, the fresh-saline interface ranges in elevations of 400 feet mean sea level along the Kentucky River up to 900 feet in the hilly southeastern corner of the county. This information was taken from the Kentucky Geological Survey’s, Madison County, Water Quality web page that are excerpts from the web publication called “Groundwater Resources in Kentucky”. This document is located at:
(http://www.uky.edu/KGS/water/library/gwatlas/Madison/Waterquality.htm).

**Water Sources and Supply**

In Madison County, public water is provided to approximately 92 percent of the county's residents. In areas not served by public water, approximately 20 percent of the households use wells and 80 percent use other sources. Groundwater yield to springs and wells is highly variable, but usually enough to meet domestic needs.

The public water suppliers in Madisno Co. and their sources are:

- The City of Richmond with their plant on the KY River near College Hill
- Madison Co. Utilities which purchases their water from Richmond
- Kirksville Water which purchases their water from Richmond
- The City of Berea with their plant next to an impoundment southeast of Berea
- Southern Madison Co. Water which purchases their water from Berea

The propsed project in this document will have a impact on the ground water quality in the PA. As more and more on-site seweage disposal is removed from the environment by including it in a managed WWTP such as NMCSD ownes and operates, the quality of the groundwater and the streams/rivers in the area where these systems have been removed should improve.

**Wetlands**

The proposed projects planned for the Facilities Plan - Planning Area will be constructed within previously disturbed road rights-of-way, on previously disturbed private property immediately adjacent to a road right-of-way, or on property currently containing a package wastewater treatment plant; therefore, these previously disturbed areas of the project do not contain wetlands. In addition, information obtained from the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory wetlands mapper (http://www.fws.gov/wetlands/Data/Mapper.html) indicates that there are no wetlands mapped in or on the proposed project areas. Of course, each project will eventually have to have a rigorous environmental review on a site-specific basis before the project will be approved and before it can go to construction.

The United States Army Corps of Engineers (USACE) was contacted to determine the possibility of environmental impacts within or adjacent to the project sites. A response was received from Mr. Jason Rhoades, Regulatory Biologist, South Branch, Regulatory Division with the USACE. Mr. Rhoades warned that if any project required the discharge of dredged or fill material into any "waters of the U.S." including wetlands, the operator will need to submit a permit application for review. A copy of the correspondence from the USACE is included in Appendix Section 10-4 of this report.

**Air Pollution**

Currently, Madison County is designated in attainment with National Ambient Air Quality Standards (NAAQS) for six pollutants issued by the Environmental Protection Agency. This is evidenced by the EPA's website https://www3.epa.gov/airquality/greenbook/anayo_ky.html that reports Kentucky Counties designated nonattainment by year for all criteria pollutants. These pollutants include ozone, sulfur dioxide, carbon monoxide, nitrogen dioxide, lead, and particulate matter less than or equal to 2.5 microns and are measured in concentrations of micrograms per cubic meter.

Air quality issues associated with the proposed project locations were reviewed, and it is not anticipated that construction of the projects proposed in the Facilities Plan and their associated collection systems will cause a negative impact on air quality in Madison County. It is anticipated that there will be little if any emissions to air during the construction and operation of the proposed wastewater system and that topographical or meteorological conditions will not hinder the dispersal of the emissions. During construction, a temporary increase in emissions will occur due to construction equipment; however, this level will decrease after the termination of the project. To control the amount of air emissions, it is expected that the contractors for the projects will operate construction equipment in accordance with state and federal regulations.

**Floodplains**

Each of the proposed project drawings (DWG 3-2 through DWG 3-11 located in the Appendix) have the 100-year floodplain, from the Federal Emergency Management Administration (FEMA) Flood Insurance Rate Map (FIRM), plotted on them.

According to the Flood Insurance Rate Maps for the project areas, the majority of the project sites are outside of the flood hazard areas. The Battlefield WWTP expansion (Project #0-2B) and the Regional WWTP expansion (Project #11-20E) have the potential to be within the borders of the 100-year flood area. This will be confirmed in the development of this project and construction will reflect this information to the appropriate government regulatory agencies at that time.

**Soils**

The Natural Resources Conservation Service (NRCS) maintains a Web Soil Survey online (http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx) and the website was accessed for this report to obtain information regarding the soils present at the proposed project sites. Three project sites were reviewed as they are subdivisions and contain an area that could be mapped where the other projects are replacement or expansion of existing facilities. These second type of project will not create additional disturbance to any previously undisturbed soils. The three projects reviewed were the Boone Village Project #0-2A, the Madison Village Project

#3-10A and the Shady Hills Project #3-10D. These reports are located in the Appendix Sections 5-5, 5-6 and 5-7 respectively.

The following soil series make up the majority of the soils located within the Boone Village Project #0-2A area:

- Shelbyville silt loam, 2 to 6 percent slopes (ShB)
- Lowell silt loam, 6 to 12 percent slopes (uLfC)
- Lowell silt loam, 12 to 20 percent slopes (uLfD)

The following soil series make up the majority (10% or more) of the soils located within the Madison Village Project #3-10A area:

- Brassfield silt loam, 12 to 30 percent slopes (BrE)
- Mercer silt loam, 2 to 6 percent slopes (MuB)
- Mercer silt loam, 6 to 12 percent slopes (MuC)
- Lowell-Faywood silt loams, 6 to 12 percent slopes (uLfC)

The following soil series make up the majority (10% or more) of the soils located within the Shady Hills Project #3-10D area:

- Brassfield silt loam, 6 to 12 percent slopes (BrC)
- Brassfield silt loam, 12 to 30 percent slopes (BrE)
- Mercer silt loam, 2 to 6 percent slopes (MuB)
- Otway silty clay, 2 to 30 percent slopes (OtE)

All these soil types have a “Very Limited” rating under the “Septic Tank Absorption Fields” column for various reasons listed.

The NRCS was contacted to obtain information regarding USDA Designated Important Farmland on or adjacent to the project property. A response was received from Ms. Perri Pedley, Soil Scientist with the NRCS. Ms. Pedley indicated that the project sites as located on the map provide to her (DWG 3-1) will not convert or negatively impact agricultural lands (Prime or Statewide Important Farmland). A copy of the correspondence from this agency is included in Appendix Section 10-5 to this report.

**Threatened and Endangered Species**

The U.S. Fish & Wildlife Service has a current listing of both plants and mammals that are Threatened or Endangered. Figure 5-7 shown below is a listing from 2013 that shows the status of Endangered, Threatened, Proposed & Candidate Species in Madison Co., Ky. This figure was taken from the US Fish & Wildlife service website.

**Figure 5-7 USFWS - Endangered, Threatened, Proposed & Candidate Listing**

U.S. Fish & Wildlife Service
Kentucky Ecological Services Field Office

330 W. Broadway, Room 265
Frankfort, KY 40601
Phone: 502-695-0468
Fax: 502-695-1024

**Endangered, Threatened, Proposed & Candidate Species in MADISON County, Kentucky**

| Group | Species | Common name | Legal* Status | Known** Potential | Special Comments |
|---|---|---|---|---|---|
| Mammals | *Myotis sodalis* | Indiana bat | E | P | |
| | *Myotis grisescens* | gray bat | E | K | |
| | *Myotis septentrionalis* | Northern long-eared bat | P | K | |
| Plants | *Trifolium stoloniferum* | running buffalo clover | E | K | |
| | *Physaria globosa* | Short's bladderpod | P | K | |

NOTES:

* Key to notations: E = Endangered, T = Threatened, P = Proposed , C = Candidate, CH = Critical Habitat

**Key to notations: K = Known occurrence record within the county, P = Potential for the species to occur within the county based upon historic range, proximity to known occurrence records, biological, and physiographic characteristics.

The Short's Bladderpod designation was upgraded to Endangered in August of 2014.

Each of these mammals and plants have potential to impact individual projects listed for the NMCSD planning area. However, as the project list indicates, most, if not all, of the Projects are on previously disturbed and regraded sites. It would be highly unlikely that the ideal habitat for the three species of bats would be found within the three subdivisions to be provided sewer services. The endangered plant species would also be unlikely candidates to be found in mowed and landscaped yards but may be found in the state road right-of-way (ROW). The plant species have been located within the state ROW in other state related road projects in the county. As the NMCSD proposed projects are developed, the disturbed sites, as well as the road ROW's, will be investigated on a per project basis.

Both the U.S. Fish and Wildlife Service (USFWS) and the Kentucky Department of Fish and Wildlife Resources (KDFWR) was contacted to obtain information regarding impacts to federal or state listed species. Mr. Doug Dawson of the KDFWR responded and Jennifer Garland, KY Field Supervisor for the USFWS stated that there were no likely significant impacts to federally listed species. The correspondence with both agencies is located in Appendix Sections 10-1 and 10-2 of this report.

**Geology**

A discussion of each proposed project's geology is below. Each of the formations are located in the Upper Ordovician age.

The Regional WWTP is located in Alluvium (Qal). The Boone Village project is located in the Calloway Creek Limestone of the Upper Ordovician age. The Madison Village project covers both the Preachersville Member of the Drakes Formation and the Reba & Terrill Members of the Ashlock Formation all in the Upper Ordovician age. The Shady Hills project covers both the

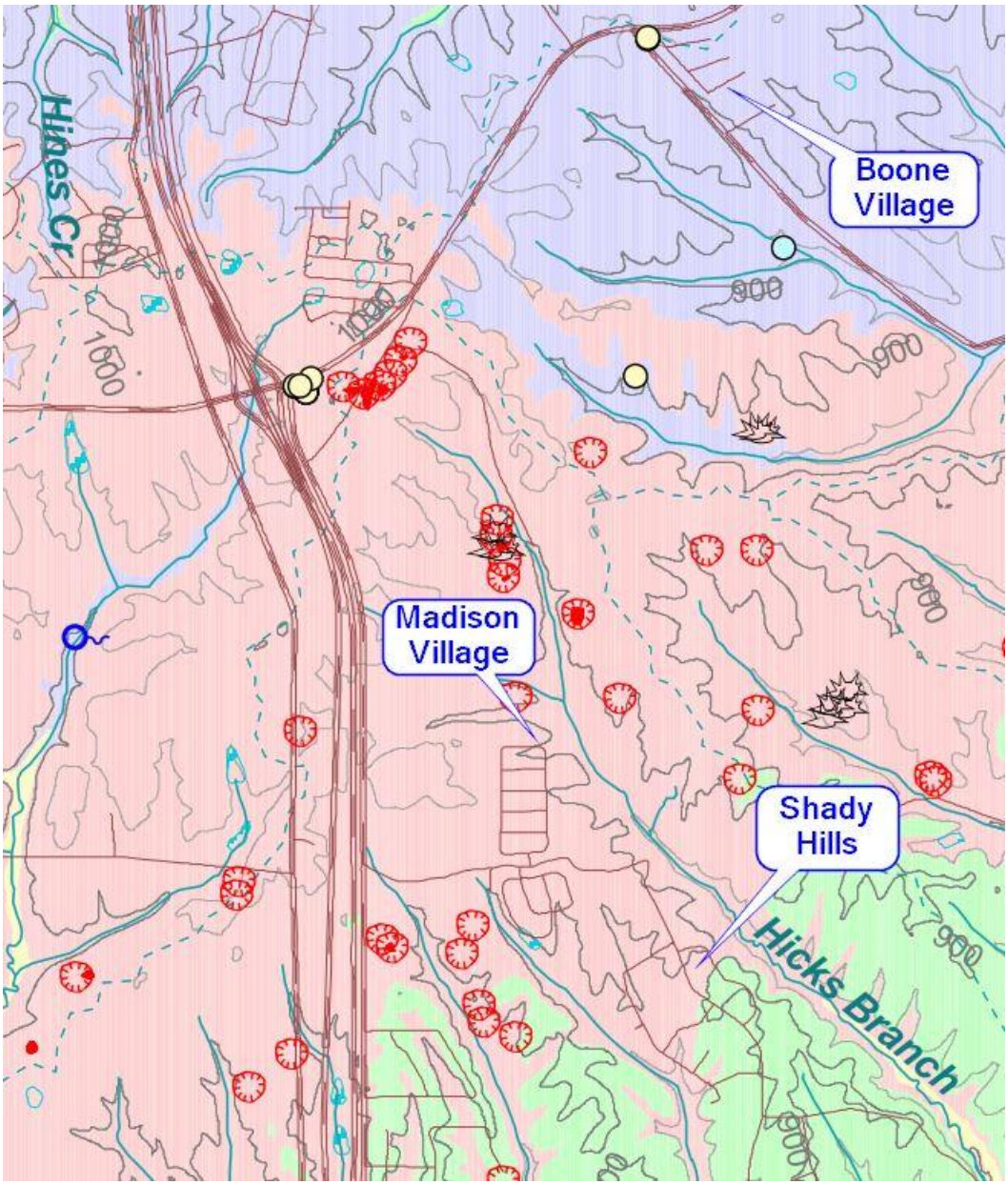
Rowland Member of the Drakes Formation as well as the Reba member of the Ashlock Formation.

The proposed Moberly Shell and the Waco Elem. School projects are located in the New Albany Shale formation (MDna) of the Middle and Upper Devonian and Lower Mississippian age. The Bybee Quick Stop is in the Irvine Formation (QTi) of the Pliocene or Pleistocene age. The Muddy Creek WWTP is located in Alluvium (Qal).

The Battlefield WWTP, Executive Park WWTP and the Twin Lakes pump station sites are all located in the Lower Part of the Ashlock Formation (Oal) in the Upper Ordovician age.

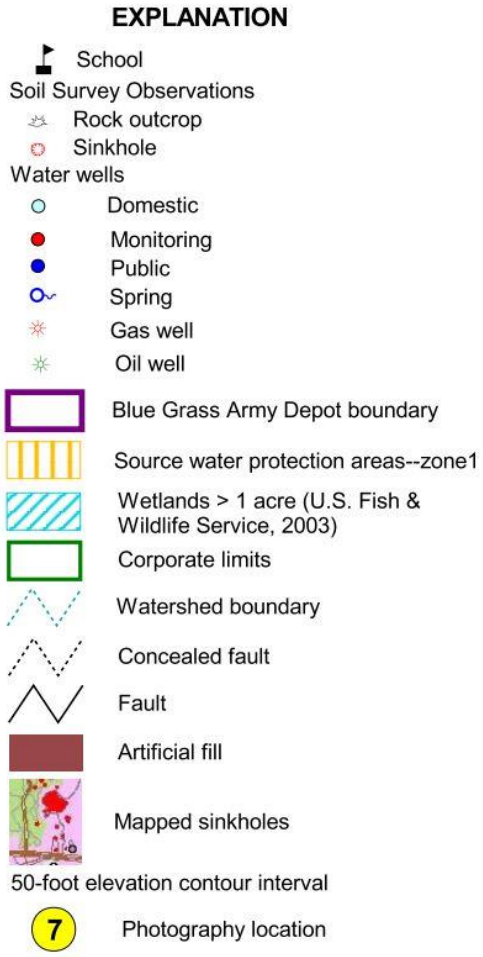
The Kentucky Geological Survey (KGS) has published a map of Madison County that is specifically for Land-Use Planning. The map has been included in the appendix to this report as DWG 5-1. The three subdivision projects (Boone Village, Madison Village and Shady Hills) that are proposed have been located on Figure 5-7 below.

**Figure 5-8 – Land-Use Planning Map of Madison Co. from KGS**




As the legend in Figure 5-8 shows, all three project sites are located in areas classified as Severe limitations for septic systems.

**Figure 5-9 – Explanation and Legend for Land-Use Map from KGS**




| Rock Unit | Foundation and Excavation | Septic System |
|---|---|---|
| 1. Sand, gravel, silt, clay | Refer to soil report (Newton and others, 1973). | Refer to soil report (Newton and others, 1973). |
| 2. Siltstone, limestone, and shale (See discussion of swelling shales.) | Fair to good foundation material; difficult to excavate. Pyrite expansion in shales possible. Easy to excavate, but poor foundation. | Severe limitations. Impermeable rock. Thin soils. Locally fast drainage through fractures and sinks to water table; possible groundwater contamination. |
| 3. Limestone and shale (See discussion of swelling shales.) | Limestone--good to excellent foundation material; difficult to excavate. Possible pyrite expansion in shales. Easy to excavate, but poor foundation. | Severe limitations. Impermeable rock. Locally fast drainage through fractures and sinks to water table; possible groundwater contamination. |
| 4. Shale and dolomite (See discussion of swelling shales.) | Dolomite--excellent foundation material; difficult to excavate. Possible pyrite expansion in shales; easy to excavate, but poor foundation. | Severe limitations. Impermeable rock. Locally fast drainage through fractures and sinks to water table; possible groundwater contamination. |
| 5. Limestone, dolomite, and shale (See discussion of swelling shales.) | Fair to good foundation material; difficult to excavate. Possible expansive shales; easy to excavate, but poor foundation. | Severe limitations. Impermeable rock.Locally fast drainage through fractures and sinks to water table; possible groundwater contamination. |
| 6. Dolomite | Excellent foundation material; difficult to excavate. | Severe limitations. Impermeable rock. Locally fast drainage through fractures and sinks to water table; possible groundwater contamination. |
| 7. Shale, siltstone, and sandstone (See discussion of swelling shales.) | Fair to good foundation material; difficult to excavate. Possible pyrite expansion in shales, Easy to excavate, but poor foundation. | Severe limitations. Thin soils. Impermeable rock. |
| 8. Sandstone | Fair to good foundation material; difficult to excavate. | Severe limitations. Thin soils. |

## Topography

Madison County predominantly lies in the Outer Blue Grass physiographic province of Kentucky, with the areas south and east of Berea being part of the Knobs region. The proposed project sites are all located at the edge of the Outer Blue Grass region, with the Knobs region beginning just across Drowning Creek to the east in neighboring Estill County. The topography consists of broad, gently rolling plateaus incised by small stream valleys of moderate relief.

The Boone Village Project site ranges in elevation from 950 ft. mean sea level (msl), at the top of the plateaus, down to approximately 885 ft. msl in the vicinity of proposed pump station. The Madison Village Project site ranges in elevation from 950 ft. msl, at the top of the plateaus, down to approximately 900 ft. msl. The Shady Hill site goes from 925 ft. msl to 875 ft. msl. Each of these three proposed projects will be a challenge to construct with gravity sewers and the minimum number of pump stations because of the rolling topography.

The Regional WWTP is located at elevation 590 ft. msl.

The Moberly Shell is located at approximately 860 ft. msl and the Waco Elem. School site is at 855 ft. msl. The Bybee Quick Stop is located at approximately 915 ft. msl. The Battlefield Estates WWTP is located at approximate elevation 940 ft. msl and the Executive Park WWTP at 960 ft. msl. The Muddy Creek WWTP is at 790 ft. msl.

**Biological Features**

The sewer system to the new and existing WWTPs will be constructed within previously disturbed road right-of-way, on previously disturbed private property immediately adjacent to a road right-of-way, or on property currently containing a package WWTP. Therefore, impacts to existing plant and animal communities is not considered to be a factor as these areas have already been disturbed. The areas that are proposed for use to expand the WWTP sites have also been previously disturbed during construction of the existing plants.

**Cultural and Historical Features**

Madison County formed in 1786 was originally part of Lincoln County (one of the three original counties in the Commonwealth of Kentucky). Before that, the area was part of Virginia. It was named for James Madison, the Father of the U.S. Constitution and later our 4$^{th}$ U.S. President. Madison County was the source of parts or all of Garrard (1797), Clay (1807), Estill (1808), Rockcastle (1810) and Jackson (1858) Counties. During the early years, this County was rural in nature with agriculture being the primary source of employment. Two trading centers were established in the County. These two centers became Richmond (established in 1798 and incorporated in 1802) and Berea (founded in 1854 and incorporated in 1890).

The driving distances in miles from major cities in the area are shown in parenthesis's after the City's name; Nashville (242), Knoxville (153), Cincinnati (103), Louisville (100), Frankfort (47) and Lexington (27). Major roadways within the County are I-75 (the dominate route which spans the county in a North/South direction with 4 and 6 lanes), US 25 (generally parallels I-75), US 421, KY Routes 21, 52, 595, 876 and 627. These routes influence both travel to and thru the county as well as residential, commercial and industrial developments along these routes.

The County is located in the Outer Bluegrass region and spans southward to the Knobs of the Appalachian Mountains. It is generally 22 miles wide (East-West) by approximately 24 miles tall (North-South) and the US Census data indicates it contains 437 square miles of area, while the density is approx. 190 people per square mile.

The historical populations of these three entities (County and two Cities) are presented in Table 4-2. These figures of population are based on Census Data and the projections (2020 through

2040) were made by the University of Louisville State Data Center (SDC). The SDC does not project City Populations. The projected population in the rural area of the County was based on the non-urban (County less Richmond and Berea) population data which generally averaged approximately 46% of the overall county population (See Table 4-4). The projected average household size is 2.26-2.35 persons/household.

The Kentucky Heritage Council was contacted regarding the possibility of historic and archaeological resources on or adjacent to the proposed project site. A letter was received from Mr. Craig Potts, Executive Director and State Historic Preservation Officer (SHPO). Mr. Potts indicated that the proposed projects had the potential to impact historic properties but could not comment on individual projects as they had not been developed far enough to identify potential effected areas or funding sources. He recommended a preliminary records request to his office and at the Office of State Archaeology located at the University of Kentucky. His correspondence is located in Appendix Section 10-3 of this report.

**Other Resource Features**

No streams or water bodies in the service area are classified as Outstanding Resource or other Special Waters. According to the KY Energy and Environment Cabinet, EEC Division of Water, KY Special Waters website, the only Outstanding State Resource Water in the county is Hines Creek, which appears to be downstream of the Shiloh Cove subdivision shown on the Source Water Area Protection Plan (DWG 3-12) from the Kentucky River backwaters to the confluence with and unidentified Tributary. This same website does not list any Outstanding Natural Resources Waters in the county.

There are no national or state parks in the vicinity of the site, or other applicable environmentally sensitive areas.

## Northern Madison County Sanitation Districts' Wastewater Systems

Northern Madison County Sanitation District (NMCSD) has four WWTPs that they currently maintain and operate as shown in Table 6-1 below.

### Table 6-1 NMCSD Waste Water Treatment Plants Capacity

| WWTP Name | Month/Year Constructed | Design Capacity (MGD) | 2019 Average Flow (MGD) | 2019 Average Flow/Design Cap. (%) | Number Customers Connected |
|---|---|---|---|---|---|
| Executive Park | Early 70's | 0.030 | 0.011 | 37 | 75 |
| Battlefield Estates | 1/1995 | 0.114 | 0.073 | 64 | 482 |
| Regional | 6/2008 | 1.000 | 0.240 | 24 | 1023 |
| Muddy Creek | 3/2016 | 0.200 | 0.075 | 38 | 400 |
| | Totals | 1.344 | 0.399 | 30 | 1980 |

Based on the data in this table, the Battlefield Estates Wastewater Treatment Plant (BF WWTP) is the plant closest to the design capacity at 64%. This plant also serves the area where the proposed and phased 125 lot subdivision expansion is located. Based on 250 gal./home/day the total flow from this proposed subdivision when totally built out, would be approx. 30,000 GPD (250 x 125 = 31,250).This amount of additional flow to the BF WWTP would then increase the flow to very near the design capacity. Thus, the 0-2-year proposal to increase the design capacity of this plant by bringing in the relocated and reconditioned Boone's Trace package plant (design capacity = 0.100GPD) and installing it next to and parallel with the existing treatment unit. This would then provide the necessary capacity for the proposed subdivision, along with creating some reserve capacity for other connections and or developments.

There are 31 commercial customers included in the total of number of customers (1980 total customers as of 2019). These commercial customers are spread across three plant, with 12 in the Battlefield service area, 9 in the Regional Plant area and 10 in the service area of Muddy Creek. There are currently no industrial customers served by NMCSD.

There is a total of eight privately owned and operated package WWTP's in the NMCSD Planning Area. The northern portion of the PA, north of Richmond, there are 4 total plants with 3 operating package plants:

1. 76 Truck Stop, exit 97 (currently closed, not in operation, no permit found)
2. PTRL, Inc., Private investor owned

3. Fort Boonesborough State Park
4. EKU Rifle Range

In the eastern portion of the PA, east of Richmond, there are also 3 operating package plants;

5. Moberly Shell
6. Waco Elementary School
7. Bybee Quick Stop (Marathon Station)

In the southern portion of the planning area, south of Richmond, there is 1 package plant in the proposed PA;

8. Kingston Elementary School

Often these small privately owned WWTP's struggle to stay in compliance with their KPDES permit limits. The elimination of as many of these plants as possible is a viable goal of the District and the KY DOW, which could improve or enhance the environment of Madison County. It is proposed to eliminate 4 (the last 4 listed, # 5-8) of these 8 package plants during the 20-year planning period

Appendix Sections 6-1 through 6-4 contains the Asset Management Reports as provided on the Kentucky Infrastructure Authority (KIA) Water Resource Info System (WRIS) web site, Wastewater System Data. This data is obtained from the District by the Area Development Districts and reported to the State KIA. These reports are in the order of the plants as listed in Table 6-1.

These reports are presented for three different types of assets: Sewer Lines, Lift Stations and Sewer Treatment Plants. The report for sewer lines indicate such items as the diameter of gravity and force mains, the pipe material, length of each diameter and type of material and the decade each was installed. Lift Station reports includes a listing of the pump stations by name, capacity and the number of pumps in the station. Treatment Plant reports have the name, design capacity, date constructed and the major expansion date. All these reports have a column for the condition (Condition ID), but no value is shown for the four asset reports on the KIA website. NMCSD has entered a value that they believe should be applicable to each asset.

Reviewing this data, one can draw some conclusions. Total length of all sewer lines in NMCSD's system = 301,128 feet (~57.03 miles). With 191,590' (~36.29 mi.) Force Main and 109,538' (~20.75 mi) of Gravity. If we assume an average distance between manholes of 200 feet, that will result in the number of manholes in this total length of pipe being approx. 550. Approx. 75% of the district's lines have been installed in decades 2000 and 2010. There are some of their oldest collection lines, i.e. 21,575', that were installed in the decades 1960 and 1970.These older lines were constructed with vitrified clay pipe as that was the most prominent pipe material used for sewers during those decades.

The Madison Village (northern area) and the Executive Park developments (southern area) are the oldest sections of the collection system. Madison Village's sewerage system was built in the 1960's and 1970's. This system was a Homeowner Association collection system with a package treatment plant. When NMCSD was formed, this was the first system to be incorporated into the District. Thus, this subdivision has some of the oldest lines within the District.

The percentage of clay tile in the entire NMCSD system is 9.6% of the gravity system, per the KY WRIS website. The Madison Village Subdivision has a significant portion of it's gravity sewers are clay tile. This area has been TV'ed and is identified as Project 3-10A. This type of material is significant becasue brittle clay tiles are a known contributor to infiltration/inflow and will be eliminated by this proposed project pending acquisition of funding. The design, plans and specs for this project have already been approved by KY DOW.

These reports indicate 19 as the number of lift stations (there is one in the Muddy Creek collection system, Waco Pump Station, that is not listed in these reports) and four sewerage treatment plants as indicated earlier (the reports also don't indicate the Executive Park treatment plant). The District just acquired a new subdivision Lift Station donated to the District by a Land Developer called Dove Landing. This additional Lift Station along with the Waco PS has the District with an actual total of 21 Lift Stations.

These Lift Stations are shown in Table 6 - 2 below in their respective collection system with the capacity, number of pumps and a condition rating and a priority rating as assigned by the District's Manager. The rating criteria and definitions of each rating are those provided at the top of the page in the KIA Asset Inventory Reports.

**Table 6-2 Lift Stations Condition**

| Service Area Name | Capacity (GPM)/# | Condition Rating | Priority Rating |
|---|---|---|---|
| **Executive Park Service Area** | | | |
| Executive Park | 100/2 | 2 | 0 |
| **Battlefield Service Area** | | | |
| Twin Lakes | 289/2 | 1 | 0 |
| **Regional WWTP Service Area** | | | |
| Adams Point # 1 | 33/2 | 3 | 2 |
| Adams Point # 2 | 33/2 | 1 | 0 |
| Boones Trace # 1 | 80/2 | 3 | 2 |
| Boones Trace # 2 | 80/2 | 2 | 1 |
| Boones Trace # 3 | 180/2 | 1 | 0 |
| Clay Lane # 1 | 365/2 | 1 | 0 |
| Exit 95 | 1597/2 | 1 | 0 |
| Exit 97 | 364/2 | 1 | 0 |
| Madison Village | 343/2 | 1 | 0 |
| Madison Village # 1 | 90/2 | 3 | 1 |
| Madison Village # 2 | 110/2 | 3 | 1 |
| Madison Village # 3 | 90/2 | 3 | 1 |
| Shiloh Point | 246/2 | 1 | 0 |
| Whitehall Manor | 27/2 | 1 | 0 |
| **Muddy Creek Service Area** | | | |
| Doves Landing | | 1 | 0 |
| Estonia | 230/2 | 1 | 0 |
| Greens crossing # 1 | 260/2 | 1 | 0 |
| Robbinsville | 122/2 | 1 | 0 |
| Waco | 80/2 | 1 | 0 |

During a meeting with the District Manager the following priorities were discussed as the goals of the District for this Regional Facilities Plan.

**0– 2 years**

- Boone Village Sewer Project - Sewer service to 69 homes and 1 commercial customer (Dollar Tree Retail Store).
- Battlefield (BF) Estates - Relocate the reconditioned Boones Trace package WWTP to the BF WWTP site and install as a parallel train to the existing plant.

**3– 10 years**

- Replace sewers, manholes and pump stations in Madison Village Subdivision to reduce I&I.
- Connect Moberly Shell (KY 52) to existing system and decommission their plant.
- Extend sewer service to Waco Elementary and decommission their package WWTP

- Extend sewer service to Shady Hills.
- Evaluate need for, design & construct WWTP and collection system West of I-75

**11– 20 years**

- Extend sewer service to Bybee Quick Stop and decommission their WWTP
- Extend sewer service to the Kingston Elem. School and decommission their package WWTP.
- Potential to decommission or expand Executive Park WWTP.
- Design Study of need for a capacity increase for Battlefield Estates WWTP.
- Design Study of need for a capacity Increase of the Regional WWTP
- Add sewer services to Exit 97 by boring under I-75.

Naturally, these are goals and can only be attained if the desired interest from the residents and the amounts of desired funding are available from various funding agencies.

### Existing Sludge Disposal Methods

Advanced Disposal picks up the sludge from three of the WWTP's and hauls this sludge to the Blue Ridge Landfill in Irvine for disposal. The sludge from the Executive Park WWTP is hauled to the Battlefield WWTP for dewatering before it is picked up and taken to the landfill.

The following table indicates the tons/month of sludge from each plant and the dewatering process that is utilized.

**Table 6-3 Sludge Volumes and Disposal**

| WWTP | Tons/month | Dewatering Process | Disposal |
|---|---|---|---|
| Executive Park | 0.5 | Hauled to Battlefield | Blue Ridge Landfill |
| Battlefield | 5.0 | Belt Press | Blue Ridge Landfill |
| Muddy Creek | 5.0 | Belt Press | Blue Ridge Landfill |
| Regional | 13.0 | Centrifuge | Blue Ridge Landfill |

**On-Site Disposal**

The Madison County Health Department (MCHD) does not maintain a list of failing septic systems. However, periodically they receive complaints of failing systems and odors in the area. In such instances, the property owner is required to fix it. MCHD personnel report that the whole region has chronic drainage problems. They have also observed several instances of more than one home sharing a common septic system. Many of the systems are so old that there is no record of when they were constructed or where they are located. Based on MCHD employee observations, the poor soil conditions, seasonal high groundwater table in much of the region, causes most of the suspected incidences of failing or marginally operating septic systems.

**Service areas for the Wastewater Treatment Plants**

Sewage collected in the northern region of the Planning Area, namely that north of the City of Richmond near Exits 95 and 97, is transported to the Regional Wastewater Treatment Plant (WWTP).

The sewage collected by NMCSD in the areas along KY 52 east of Richmond, are transported to the Muddy Creek WWTP.

The Battlefield Park subdivision is serviced by the Battlefield WWTP while the wastewater from the Executive Park subdivision is processed at the Executive Park WWTP. Appendix 7, Section contains a process flow diagram for each of the four of these treatment plants owned and operated by NMCSD.

The last year's data from these four NMCSD wastewater treatment plants as well as the four smaller privately owned package treatment plants are summarized and discussed below. The current Kentucky Pollutant Discharge Elimination System (KPDES) permit for each of the treatment plants is in the Appendix for review. Also included in this appendix is a copy of the Open Records request letter for this data. Any non-compliance data has been pointed out and discussed. There have been no state or federal orders against the Northern Madison County Sanitation District.

Project #11-20F Exit 97 – Extend Sewer to Simpson Lane will remove an out of service package treatment plant that existed to treat the flow from the old 76 Truck Stop, which has been out of service for a number of years. It is proposed that the wastewater from this area will now flow by a new gravity sewer line to a new pump station located at Simpson Lane. The force main from this PS will parallel the gravity line and be bored under I-75 to the existing NMCSD PS at Exit 97.

The Truck Stop WWTP was not listed on the Water Resource Information System (WRIS) web site and it is thought the plants approved discharge permit had expired. Therefore, no permit information or active data could be located and thus has not been included for this plant.

## EXECUTIVE PARK

| | |
|---|---|
| Permit Number: | KY0056561 |
| Agency Interest No.: | 2823 |
| Owner: | Northern Madison Co. Sanitation District |
| Receiving Waters: | Hays Fork |
| Effective Date: | 1/1/2019 |
| Expire Date: | 12/31/2023 |
| Average Daily Flow: | 0.015 MGD (From Last 12 Months Average) |
| Design Flow: | 0.030 MGD |
| Treatment: | Screening<br>Chlorine Disinfection<br>Activated Sludge |
| Effluent Limits: | See attached permit |

The Executive Park Sewage Treatment plant consists of a two parallel trains of extended aeration steel package treatment plant. The package plant is in fair condition, exhibiting typical signs of wear for a steel plant of its age. WWTP has equipment in-place for plug-in connection of an auxiliary power source (portable electric generator).

The WWTP produces a high-quality effluent. For example, in data from 2nd Quarter 2019 through 1st Quarter 2020, the average effluent $CBOD_5$ and TSS were 3.5 mg/l and 5.6 mg/l respectively. Furthermore, no effluent violation occurred that year. Tables 7-1 thru 7-3, provide flow and analytical DMR data respectively.

**Table 7-1**
**Executive Park WWTP – 2019 - 2020 Flows**

| Date | Flow (Effluent) | |
|---|---|---|
| | Mo. Avg (gpd) | Max Day (gpd) |
| 2nd Q 2019 | 11,000 | 29,000 |
| 3rd Q 2019 | 14,000 | 14,000 |
| 4th Q 2019 | 14,000 | 14,000 |
| 1st Q 2020 | 21,000 | 29,000 |
| Average | 15,000 | --- |
| Maximum | 21,000 | 29,000 |

## Table 7-2
## Executive Park WWTP – Performance Data, 2019 - 2020

| | TSS | | CBOD5 | | NH3-N Season 1 | | NH3-N Season 2 | |
|---|---|---|---|---|---|---|---|---|
| Date | mo avg (mg/l) | max wk (mg/l) | mo avg (mg/l) | mo avg (mg/l) | mo avg (mg/l) | day max (mg/l) | mo avg (mg/l) | day max (mg/l) |
| 2nd Q 2019 | 4 | 4 | 3 | 3 | 0.28 | 0.28 | NODI 9 | NODI 9 |
| 3rd Q 2019 | 5.6 | 5.6 | 3 | 3 | NODI 9 | NODI 9 | NODI B | NODI B |
| 4th Q 2019 | 7.8 | 7.8 | 4 | 4 | NODI 9 | NODI 9 | 0.25 | 0.25 |
| 1st Q 2020 | 5 | 5 | 4 | 4 | NODI 9 | NODI 9 | 0.25 | 0.25 |
| Avg | 5.6 | --- | 3.5 | --- | .28 | --- | .25 | --- |
| Max | --- | 7.8 | --- | 4 | --- | .28 | --- | .25 |
| Limit | 30 | 45 | 25 | 37.5 | 4 | 6 | 10 | 15 |
| Violations | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

NODI 9 - Stands for Conditional Monitoring – Not Required this Period
NODI B - Stands for Below Detection Limit/No Detection
TSS – Stands for Total Suspended Solids
NH3-N – Stands for Ammonia-Nitrogen and the limits are based on which season the samples are taken
CBOD5 – Stands for Biochemical Oxygen Demand (Carbonaceous) in 5 days

## Table 7-3
## Executive Park WWTP – Performance Data, 2019 – 2020 (Continued)

| | pH Min | pH Max | D.O. | Total Res. Chlorine | | E. coli | |
|---|---|---|---|---|---|---|---|
| Date | month eff (S.U.) | month eff (S.U.) | Mo. min eff (mg/l) | Mo. avg eff (mg/l) | day max eff (mg/l) | 30-d G.M eff (#/100 ml) | 7-d G.M eff (#/100 ml) |
| 2nd Q 2019 | 7.03 | 7.03 | 8.76 | NODI B | NODI B | 1 | 1 |
| 3rd Q 2019 | 7.31 | 7.31 | 7.88 | NODI B | NODI B | 1 | 1 |
| 4th Q 2019 | 7.47 | 7.47 | 7.32 | NODI B | NODI B | 1 | 1 |
| 1st Q 2020 | 7.42 | 7.42 | 8.61 | NODI B | NODI B | 1 | 1 |
| Avg | --- | --- | --- | NODI B | --- | 1 | 1 |
| Min | 7.03 | --- | 7.32 | --- | --- | --- | --- |
| Max | --- | 7.47 | --- | --- | NODI B | --- | --- |
| Limit | 6.0 | 9.0 | 7.0 | 0.011 | 0.019 | 130 | 240 |
| Violations | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

S.U. - Stands for Standard Units
NODI B - Stands for Below Detection Limit/No Detection
D.O. – Stands for Dissolved Oxygen
30 d G.M. - Stands for 30 Day Geometric Mean
7 d G.M. - Stands for 7 Day Geometric Mean

## BATTLEFIELD ESTATES

| | |
|---|---|
| Permit Number: | KY0102971 |
| Agency Interest No.: | 2801 |
| Owner: | Northern Madison Co. Sanitation District |
| Receiving Waters: | Unnamed Tributary to Hays Fork |
| Effective Date: | 6/1/2018 |
| Expire Date: | 5/31/2023 |
| Average Daily Flow: | 0.1008 MGD (From Last 12 Months Average) |
| Design Flow: | 0.114 MGD |
| Treatment: | Activated Sludge<br>Screening<br>Grinding<br>Extended Aeration<br>Polishing Lagoon<br>Disinfection-Chlorine<br>Dechlorination |
| Effluent Limits: | See attached permit |

The WWTP produces a high-quality effluent. For example, in the data from June 2019 to May 2020 the average effluent $CBOD_5$ and TSS were 7.05 mg/l and 5.37 mg/l respectively. Two exceedances were recorded in the data that were for the same date and the same parameter, so that only one violation was written.

The exceedance was in March of 2020 where a 44 mg/l exceeded the limit of 22.5 mg/l for the maximum weekly average of CBOD5 (BOD, Carbonaceous [5day, 20C]) parameter). This same date had a parallel exceedance of 44.4 pounds per day (ppd) in the BOD5 parameter for the maximum weekly average for the pounds per day which has a limit of 21.4 ppd. In both cases the average for the month value was well below the limit, so it appears to have been a one-day spike in the data. A notice of Violation number ENV20200001 was issued for this exceedance.

Tables 7-4 thru 7-9, provide flow and analytical DMR data respectively.

**Table 7-4**

**Battlefield Estates WWTP - June 2019 through May 2020 Flows**

| Month | Flow Monthly Average Effluent | | Flow Weekly Maximum Effluent | | Flow Monthly Average Influent | | Flow Weekly Maximum Influent | |
|---|---|---|---|---|---|---|---|---|
| | 2019 (gpd) | 2020 (gpd) | 2019 (gpd) | 2020 (gpd) | 2019 (gpd) | 2020 (gpd) | 2019 (gpd) | 2020 (gpd) |
| Jan | | 318,000 | | 98,000 | | 285,000 | | 74,000 |
| Feb | | 128,000 | | 305,000 | | 97,000 | | 218,000 |
| Mar | | 104,000 | | 219,000 | | 93,000 | | 221,000 |
| Apr | | 72,000 | | 206,000 | | 78,000 | | 153,000 |
| May | | 93,000 | | 261,000 | | 80,000 | | 199,000 |
| Jun | 89,000 | | 167,000 | | 108,000 | | 250,000 | |
| Jul | 65,000 | | 305,000 | | 80,000 | | 224,000 | |
| Aug | 47,000 | | 67,000 | | 75,000 | | 126,000 | |
| Sept | 36,000 | | 88,000 | | 76,000 | | 126,000 | <= NOTE |
| Oct | 53,000 | | 132,000 | | 85,000 | | 142,000 | |
| Nov | 79,000 | | 345,000 | | 81,000 | | 193,000 | |
| Dec | 126,000 | | 430,000 | | 85,000 | | 321,000 | |
| Average | 100,833 | | --- | | 101,917 | | --- | |
| Maximum | 318,000 | | 430,000 | | ---- | | 321,000 | |

NOTE: Sept. of 2019 flow number was recorded as 126 million gallons instead of 126 thousand.
gpd – Stands for Gallons Per Day

**Table 7-5**

**Battlefield Estates WWTP – Performance Data, June 2019 through May 2020**

| Month | TSS | | | | | | |
|---|---|---|---|---|---|---|---|
| | Monthly Avg | | | Weekly Max | | Mo. Avg | Wk. Max |
| | inf (mg/l) | eff (mg/l) | % rem | inf (mg/l) | eff (mg/l) | eff (ppd) | eff (ppd) |
| Jun 2019 | 284 | 5 | 98 | 427 | 7 | 2.9 | 4 |
| Jul 2019 | 381 | 8.8 | 98 | 456 | 11 | 3.96 | 6.16 |
| Aug 2019 | 270 | 7.75 | 97 | 430 | 10 | 3.11 | 3.87 |
| Sept 2019 | 236 | 8.25 | 97 | 258 | 14 | 3.6 | 5.9 |
| Oct 2019 | 258 | 5.4 | 98 | 448 | 8 | 2.46 | 4.87 |
| Nov 2019 | 276 | 3 | 99 | 318 | 4 | 1.88 | 2.57 |
| Dec 2019 | 226 | 3.75 | 98 | 403 | 7 | 8 | 25 |
| Jan 2020 | 434 | 4.6 | 99 | 1,019 | 12 | 3.37 | 8 |
| Feb 2020 | 220 | 3.75 | 98 | 411 | 9 | 5.5 | 10.73 |
| Mar 2020 | 322 | 6.5 | 98 | 506 | 17 | 3.73 | 7.37 |
| Apr 2020 | 293 | 3.6 | 99 | 419 | 7 | 2.52 | 6.42 |
| May 2020 | 382 | 4 | 99 | 654 | 6 | 4.67 | 13.06 |
| Avg | 299 | 5.37 | 98 | --- | --- | 3.81 | --- |
| Max | --- | --- | --- | 1,019 | 17 | --- | 25 |
| Limit | report | 30 | 85 | report | 45 | 28.5 | 42.8 |
| Violations | --- | 0 | 0 | --- | 0 | 0 | 0 |

ppd - Stands for Pounds Per Day
TSS – Stands for Total Suspended Solids

**Table 7-6**
**Battlefield Estates WWTP – Performance Data (Continued)**

| | CBOD5 | | | | | | |
|---|---|---|---|---|---|---|---|
| | Month Avg. | | | Week Max. | | Mo. Avg | Wk. Max. |
| Month | Influent (mg/l) | Effluent (mg/l) | % Rem | Influent (mg/l) | Effluent (mg/l) | Eff (ppd) | Eff (ppd) |
| Jun 2019 | 314 | 5.5 | 98 | 476 | 7 | 3.1 | 4.03 |
| Jul 2019 | 349 | 7.2 | 98 | 507 | 9 | 3.27 | 5.47 |
| Aug 2019 | 631 | 9 | 99 | 956 | 11 | 3.47 | 5.32 |
| Sept 2019 | 413 | 7 | 98 | 531 | 8 | 2.74 | 3.67 |
| Oct 2019 | 484 | 5 | 99 | 945 | 8 | 2.42 | 3.65 |
| Nov 2019 | 361 | 5.25 | 99 | 460 | 10 | 3.68 | 8.26 |
| Dec 2019 | 309 | 4 | 99 | 430 | 6 | 5 | 10.8 |
| Jan 2020 | 318.5 | 4.2 | 99 | 447 | 7 | 3.01 | 4.67 |
| Feb 2020 | 346 | 5.5 | 98 | 815 | 8 | 7.78 | 20.35 |
| Mar 2020 | 387 | 13.75 | 96 | 681 | 44 | 12.92 | 44.4 |
| Apr 2020 | 522 | 8.4 | 98 | 748 | 18 | 6.06 | 16.51 |
| May 2020 | 553 | 9.75 | 98 | 910 | 20 | 8.25 | 15.24 |
| Avg | 416 | 7.05 | 98 | --- | --- | 5.14 | --- |
| Max | --- | --- | --- | 956 | 44 | --- | 44.4 |
| Limit | report | 15 | 85 | report | 22.5 | 14.3 | 21.4 |
| Violations | --- | 0 | 0 | --- | 1 | 0 | 1 |

CBOD5 – Stands for Biochemical Oxygen Demand (Carbonaceous) in 5 days

**Table 7-7**
**Battlefield Estates WWTP – Performance Data (Continued)**

| Month | pH Min | pH Max | D.O. | Total Res. Chlorine | | E. coli | |
|---|---|---|---|---|---|---|---|
| | Month Effluent (S.U.) | Month Effluent (S.U.) | Mo. Min. Eff. (mg/l) | Mo. Avg. Eff (mg/l) | Day Max. Eff. (mg/l) | 30-d G.M eff (#/100 ml) | 7-d G.M eff (#/100 ml) |
| Jun 2019 | 7.43 | 7.57 | 7.3 | NODI B | NODI B | 1 | 1 |
| Jul 2019 | 7.12 | 7.81 | 7.2 | NODI B | NODI B | 1 | 2 |
| Aug 2019 | 7.17 | 7.38 | 7.47 | 0 | -9999 | 1 | 1 |
| Sept 2019 | 7.37 | 7.45 | 7.44 | NODI B | NODI B | 1 | 1 |
| Oct 2019 | 7.52 | 7.66 | 7.51 | NODI B | NODI B | 1 | 1 |
| Nov 2019 | 6.59 | 7.78 | 7.85 | NODI B | NODI B | 1 | 1 |
| Dec 2019 | 6.87 | 7.84 | 8.76 | NODI B | NODI B | 1 | 1 |
| Jan 2020 | 7.39 | 7.65 | 8.32 | NODI B | NODI B | 1 | 1 |
| Feb 2020 | 7.12 | 7.63 | 8.12 | NODI B | NODI B | 1 | 1 |
| Mar 2020 | 6.9 | 7.83 | 7.4 | NODI B | NODI B | 1.82 | 11.7 |
| Apr 2020 | 7.21 | 7.72 | 7.45 | NODI B | NODI B | 1 | 1 |
| May 2020 | 7.12 | 7.81 | 8.04 | NODI B | NODI B | 3.06 | 43.7 |
| Avg | --- | --- | --- | NODI B | NODI B | --- | --- |
| Min | 6.59 | --- | 7.2 | --- | --- | --- | --- |
| Max | --- | 7.84 | ---- | 0.000 | NODI B | 3.06 | 43.7 |
| Limit | 6.0 | 9.0 | 7.0 | 0.011 | 0.019 | 130 | 240 |
| Violations | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

D.O. – Stands for Dissolved Oxygen
S.U. - Stands for Standard Units
NODI B - Stands for Below Detection Limit/No Detection
30 d G.M. - Stands for 30 Day Geometric Mean
7 d G.M. - Stands for 7 Day Geometric Mean
-9999 – indicates an apparent error in recording – value discarded

**Table 7-8**
**Battlefield Estates WWTP – Performance Data (Continued)**

| Month | NH3-N | | | | | | Total N-N | |
|---|---|---|---|---|---|---|---|---|
| | Mo. Avg Inf (mg/l) | Max. Day Inf (mg/l) | Mo. Avg. Eff (mg/l) | Max. Day Eff (mg/l) | Mo. avg Eff (mg/l) | Max Day Eff (mg/l) | Mo. Avg Eff (mg/l) | Max Day Eff (mg/l) |
| Jun 2019 | 41.35 | 49 | 0.77 | 0.83 | --- | --- | 9.46 | 12.8 |
| Jul 2019 | 31.5 | 33.4 | 1.9 | 2.33 | --- | --- | 8.25 | 13.4 |
| Aug 2019 | 54.15 | 58.18 | 1.98 | 2.29 | --- | --- | 11.04 | 18.18 |
| Sept 2019 | 58.74 | 63.24 | 1.8 | 2.29 | --- | --- | 14.2 | 18.69 |
| Oct 2019 | 57.92 | 86.16 | 3.2 | 4.11 | --- | --- | 18.326 | 22.98 |
| Nov 2019 | 39.9 | 61.8 | --- | --- | 4.47 | 6.28 | 24.88 | 47.5 |
| Dec 2019 | 31.7 | 38.8 | --- | --- | 3.62 | 5.45 | 11.23 | 14.7 |
| Jan 2020 | 43.58 | 50.1 | --- | --- | 4.08 | 5.19 | 10.53 | 15.2 |
| Feb 2020 | 30.1 | 43.7 | --- | --- | 3.2 | 4.43 | 8.73 | 13.1 |
| Mar 2020 | 30.6 | 43.4 | --- | --- | 4.4 | 6.52 | 10.21 | 14.5 |
| Apr 2020 | 34.5 | 47.1 | --- | --- | 5.94 | 7.74 | 11.64 | 13.6 |
| May 2020 | 29.6 | 53 | 3.02 | 4.35 | --- | --- | 10.88 | 11.7 |
| Avg | 40.30 | --- | 2.11 | --- | 4.29 | --- | 12.45 | --- |
| Max | --- | 86.16 | --- | 4.35 | --- | 7.74 | --- | 47.5 |
| Limit | report | report | 4 | 6 | 10 | 15 | report | report |
| Violations | --- | --- | 0 | 0 | 0 | 0 | --- | --- |

NH3-N – Stands for Ammonia-Nitrogen and the limits are based on which season the samples are taken
Total N-N - Stands for Total Nitrogen as N

**Table 7-9**
**Battlefield Estates WWTP – Performance Data (Continued)**

| Month | Total P-P | | | |
|---|---|---|---|---|
| | Monthly Avg. Influent (mg/l) | Max Daily Influent (mg/l) | Monthly Avg. Effluent (mg/l) | Max. Daily effluent (mg/l) |
| Jun 2019 | 4.53 | 6.26 | 3.73 | 4.85 |
| Jul 2019 | 4.91 | 6.63 | 4.01 | 4.35 |
| Aug 2019 | 6.96 | 8.41 | 4.25 | 4.91 |
| Sept 2019 | 5.66 | 6.22 | 5.23 | 5.6 |
| Oct 2019 | 6.29 | 10 | 3.03 | 4.94 |
| Nov 2019 | 5.54 | 8.07 | 2.53 | 3.28 |
| Dec 2019 | 4.88 | 7.01 | 2.87 | 3.13 |
| Jan 2020 | 4.31 | 6.76 | 3.23 | 3.63 |
| Feb 2020 | 4.78 | 10.9 | 2.31 | 3.44 |
| Mar 2020 | 6.05 | 10.7 | 3.94 | 4.22 |
| Apr 2020 | 6.76 | 10.6 | 4.48 | 7.07 |
| May 2020 | 6.67 | 11 | 4.6 | 6.26 |
| Avg | 5.61 | --- | 3.68 | --- |
| Max | --- | 11 | --- | 7.07 |
| Limit | report | report | report | report |
| Violations | --- | --- | --- | --- |

Total P-P - Stands for Total Phosphorus as P

## NMCSD REGIONAL WWTP

| | |
|---|---|
| Permit Number: | KY0105376 |
| Agency Interest No.: | 44280 |
| Owner: | Northern Madison Co. Sanitation District |
| Receiving Waters: | Kentucky River |
| Effective Date: | 6/1/2016 |
| Expire Date: | 5/31/2021 |
| Average Daily Flow: | 0.205 MGD (From Last 12 Months Average) |
| Design Flow: | 1.0 MGD |
| Treatment: | Screening<br>Grit Removal<br>Influent Equalization<br>Sequencing Batch Reactor<br>Effluent Equalization<br>UV Disinfection |
| Sludge treatment: | Aerobic Sludge Digestor & taken to approved landfill |
| Effluent Limits: | See attached permit |

Construction of the NMCSD Regional WWTP was completed in 2008. It consists of a sequencing batch reactor process with related front and back-end processes. The treatment plant is in excellent condition, and currently requires no capital improvements other than routine preventative maintenance.

Because the current maximum monthly average flow of 0.20 MGD is well below the 1.0 MGD design capacity of the wastewater treatment plant, no need for an expansion of the treatment plant is anticipated any time in the immediate future. In the 11-20 year time period, this statement will be revised and the expansion of the WWTP will be reconsidered.

The WWTP produces a high-quality effluent. For example, in 2019-2020 time period the average effluent $BOD_5$ and TSS were 5.88 mg/l and 5.4 mg/l respectively. There were no effluent violations that year. Tables 7-10 thru 7-15, provide flow and analytical DMR data respectively.

**Table 7-10**
**NMCSD Regional WWTP - 2019 - 2020 Flows (GPD)**

| Month | Monthly Average Effluent | | Weekly Maximum Effluent | |
|---|---|---|---|---|
| | 2019 | 2020 | 2019 | 2020 |
| Jan | | 236,000 | | 406,000 |
| Feb | | 303,000 | | 897,000 |
| Mar | | 247,000 | | 440,000 |
| Apr | | 204,000 | | 502,000 |
| May | | 260,000 | | 1,050,000 |
| Jun | 199,000 | | 399,000 | |
| Jul | 136,000 | | 283,000 | |
| Aug | 130,000 | | 190,000 | |
| Sept | 117,000 | | 174,000 | |
| Oct | 145,000 | | 268,000 | |
| Nov | 210,000 | | 517,000 | |
| Dec | 282,000 | | 816,000 | |
| Average | 205,750 | | --- | |
| Maximum | 303,000 | | 1,050,000 | |

**Table 7-11**
**NMCSD Regional WWTP – 2019 - 2020 Performance Data**

| | Total Suspended Solids (TSS) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Monthly Avg. | | | Weekly Max. | | Mo. Avg. | Wk. Max. |
| 2019-2020 | Influent (mg/l) | Effluent (mg/l) | % rem | Influent (mg/l) | Effluent (mg/l) | Effluent (ppd) | Effluent (ppd) |
| Jun | 159 | 1.5 | 99 | 349 | 2 | 1.85 | 3.4 |
| Jul | 142 | 1.75 | 99 | 201 | 2 | 1.56 | 2.37 |
| Aug | 198 | 1.5 | 99 | 291 | 2 | 1.53 | 2.7 |
| Sep | 205 | 1.5 | 99 | 344 | 3 | 1.35 | 2.43 |
| Oct | 82.2 | 6 | 93 | 105 | 11 | 6.87 | 12.11 |
| Nov | 96 | 5.25 | 95 | 112 | 9 | 9.85 | 25.67 |
| Dec | 170 | 11 | 94 | 320 | 15 | 31 | 69 |
| Jan | 119 | 8 | 93 | 322 | 12 | 8.47 | 10.91 |
| Feb | 103 | 11 | 89 | 284 | 29 | 38.22 | 120.7 |
| Mar | 73 | 6.5 | 91 | 87 | 8 | 12.82 | 19.15 |
| Apr | 110 | 5 | 95 | 185 | 8 | 7.21 | 13.34 |
| May | 229 | 6 | 97 | 482 | 15 | 16.26 | 26.77 |
| Avg | 140 | 5.4 | 95 | --- | --- | 11.42 | --- |
| Max | -- | --- | --- | 482 | 29 | --- | 120.7 |
| Limit | report | 30 | 85 | report | 45 | 250.00 | 375.00 |
| Violations | --- | 0 | 0 | --- | 0 | 0 | 0 |

**Table 7-12**
**NMCSD Regional WWTP – 2019 - 2020 Performance Data (Continued)**

| | BOD5 | | | | | | |
|---|---|---|---|---|---|---|---|
| | Monthly Avg. | | | Weekly Max. | | Mo. Avg. | Wk. Max. |
| 2019-2020 | Influent (mg/l) | Effluent (mg/l) | % rem | Influent (mg/l) | Effluent (mg/l) | Effluent (ppd) | Effluent (ppd) |
| Jun | 160 | 3 | 98 | 200 | 4 | 3.92 | 6.81 |
| Jul | 248 | 2.75 | 99 | 350 | 5 | 2.6 | 5.9 |
| Aug | 268 | 3 | 99 | 420 | 4 | 2.97 | 4.64 |
| Sep | 235 | 2 | 99 | 420 | 2 | 1.88 | 2.64 |
| Oct | 168 | 3.5 | 98 | 238 | 5 | 4.03 | 5.5 |
| Nov | 171 | 4.25 | 98 | 202 | 9 | 8.63 | 25.67 |
| Dec | 136 | 6.5 | 95 | 220 | 9 | 15 | 23 |
| Jan | 202 | 8.25 | 96 | 479 | 17 | 11 | 20.38 |
| Feb | 185 | 13.5 | 93 | 234 | 22 | 41.63 | 91.56 |
| Mar | 268 | 7.75 | 97 | 480 | 14 | 15.65 | 33.51 |
| Apr | 266 | 7.8 | 97 | 407 | 13 | 12.62 | 35.67 |
| May | 263 | 8.25 | 97 | 514 | 15 | 20.83 | 35.03 |
| Avg | 214 | 5.88 | 97 | --- | --- | 11.73 | --- |
| Max | --- | --- | --- | 514 | 22 | --- | 91.56 |
| Limit | report | 30 | 85 | report | 45 | 250.00 | 375.00 |
| Violations | --- | 0 | 0 | --- | 0 | 0 | 0 |

BOD5 – Stands for Biochemical Oxygen Demand in 5 days
ppd - Stands for Pounds Per Day
mg/l - Stands for Milligrams per Liter

**Table 7-13**
**NMCSD Regional WWTP – 2019 - 2020 Performance Data (Continued)**

| 2019-2020 | NH3-N | | | | Total N-N | |
|---|---|---|---|---|---|---|
| | Mo. Avg. Effluent (mg/l) | Max. Day Effluent (mg/l) | Mo. Avg. Effluent (ppd) | Max. Wk Effluent (ppd) | Mo. Avg. Effluent (mg/l) | Max. Day Effluent (mg/l) |
| Jun | 0.25 | 0.25 | 0.31 | 0.43 | 12.75 | 17.9 |
| Jul | 0.26 | 0.28 | 0.22 | 0.44 | 21.1 | 27.1 |
| Aug | 0.25 | 0.26 | 0.25 | 0.34 | 22 | 24.1 |
| Sept | 0.25 | 0.26 | 0.24 | 0.34 | 25.63 | 30.4 |
| Oct | 0.34 | 0.51 | 0.39 | 0.61 | 28.95 | 36 |
| Nov | 0.98 | 3.15 | 2.46 | 8.98 | 23.58 | 29.6 |
| Dec | 0.25 | 0.25 | 0.65 | 1.16 | 11.78 | 27.5 |
| Jan | 0.25 | 0.25 | 0.36 | 0.73 | 13.67 | 18.3 |
| Feb | 0.31 | 0.48 | 1 | 2 | 14.88 | 23.1 |
| Mar | 0.64 | 1.46 | 1.26 | 3.49 | 18.98 | 27 |
| Apr | 0.43 | 0.72 | 0.61 | 1.21 | 10.88 | 16 |
| May | 0.58 | 1.29 | 1.47 | 2.19 | 7.91 | 9.76 |
| Avg | 0.40 | --- | 0.77 | --- | 17.68 | --- |
| Max | --- | 3.15 | --- | 8.98 | --- | 36 |
| Limit | 20 | 30 | 167 | 250 | report | report |
| Violations | 0 | 0 | 0 | 0 | --- | --- |

ppd - Stands for Pounds Per Day
NH3-N – Stands for Ammonia-Nitrogen and the limits are based on which season the samples are taken
Total N-N - Stands for Total Nitrogen as N

**Table 7-14**
**NMCSD Regional WWTP – 2019 - 2020 Performance Data (Continued)**

| | pH - min | pH - max | D.O. | E. coli | |
|---|---|---|---|---|---|
| 2019-2020 | Month Effluent (S.U.) | Month Effluent (S.U.) | Weekly Effluent (mg/l) | 30-d G.M Effluent (#/100 ml) | 7-d G.M Effluent (#/100 ml) |
| Jun | 6.61 | 7.35 | 3.21 | 23.1 | 123.6 |
| Jul | 6.45 | 6.96 | 2.82 | 3.5 | 29.5 |
| Aug | 6.47 | 7.04 | 4.21 | 5.63 | 32.7 |
| Sep | 6.67 | 7.15 | 4.23 | 12.05 | 26.9 |
| Oct | 6.94 | 7.68 | 4.21 | 9.73 | 20.3 |
| Nov | 6.74 | 7.48 | 3.21 | 21.79 | 52.8 |
| Dec | 6.55 | 7.12 | 4.21 | 112 | 178.5 |
| Jan | 6.29 | 7.34 | 4.21 | 12.97 | 111.2 |
| Feb | 6.13 | 7.54 | 4.21 | 2.85 | 11 |
| Mar | 6.7 | 7.27 | 3.81 | 8.15 | 9.8 |
| Apr | 6.36 | 7.26 | 4.21 | 2.67 | 45 |
| May | 6.84 | 7.2 | 4.55 | 2.73 | 56.3 |
| Min | 6.13 | --- | 2.82 | --- | --- |
| Max | --- | 7.68 | --- | 112 | 178.5 |
| Limit | 6.0 | 9.0 | 2.0 | 130 | 240 |
| Violations | 0 | 0 | 0 | 0 | 0 |

S.U. - Stands for Standard Units
D.O. – Stands for Dissolved Oxygen
30 d G.M. - Stands for 30 Day Geometric Mean
7 d G.M. - Stands for 7 Day Geometric Mean

**Table 7-15**
**NMCSD Regional WWTP – 2019 - 2020 Performance Data (Continued)**

| | Total P-P | | | | | |
|---|---|---|---|---|---|---|
| 2019-2020 | Mo. Avg. Effluent (mg/l) | Max. Day Effluent (mg/l) | Mo. Avg. Effluent (mg/l) | Max. Day Effluent (mg/l) | Mo. Avg. Effluent (mg/l) | Max. Day Effluent (mg/l) |
| Jun | NODI 9 | NODI 9 | NODI 9 | NODI 9 | 4.08 | 5.94 |
| Jul | NODI 9 | NODI 9 | NODI 9 | NODI 9 | 6.34 | 8.29 |
| Aug | NODI 9 | NODI 9 | 1.2 | 1.25 | 5.23 | 5.57 |
| Sept | 0.69 | 0.78 | 1.31 | 1.31 | NODI 9 | NODI 9 |
| Oct | 0.36 | 0.43 | 0.87 | 0.87 | 2.85 | 3.72 |
| Nov | NODI 9 | NODI 9 | NODI 9 | NODI 9 | 3.79 | 4.53 |
| Dec | NODI 9 | NODI 9 | NODI 9 | NODI 9 | 2.51 | 3.75 |
| Jan | NODI 9 | NODI 9 | NODI 9 | NODI 9 | 2.84 | 6.16 |
| Feb | NODI 9 | NODI 9 | NODI 9 | NODI 9 | 2.16 | 3.25 |
| Mar | NODI 9 | NODI 9 | NODI 9 | NODI 9 | 3.14 | 3.81 |
| Apr | NODI 9 | NODI 9 | NODI 9 | NODI 9 | 2.17 | 3.38 |
| May | NODI 9 | NODI 9 | NODI 9 | NODI 9 | 2.96 | 3.91 |
| Avg | 0.53 | --- | 1.13 | --- | 2.65 | --- |
| Max | --- | 0.78 | --- | 1.31 | --- | 8.29 |
| Limit | 1 | Report | 2 | Report | Report | Report |
| Violations | 0 | --- | 0 | --- | --- | --- |

**NODI 9 stands for Conditional Monitoring – Not Required This Period
Total P-P - Stands for Total Phosphorus as P

**MUDDY CREEK WWTP**

| | |
|---|---|
| Permit Number: | KY0111449 |
| Agency Interest No.: | 120481 |
| Owner: | Northern Madison Co. Sanitation District |
| Receiving Waters: | Muddy Creek |
| Effective Date: | 7/1/2019 |
| Expire Date: | 6/30/2024 |
| Average Daily Flow: | 0.085 MGD (From Last 12 Months Average) |
| Design Flow: | 0.200 MGD |
| Treatment: | Screening<br>Equalization<br>Extended Aeration<br>Chlorination Disinfection<br>Post Aeration<br>Dechlorination<br>Aerobic Sludge<br>Digestion |
| Effluent Limits: | See attached permit |

Because the current maximum monthly average flow of 0.0845 MGD is well below the 0.2 MGD design capacity of the wastewater treatment plant, no need for an expansion of the treatment plant is anticipated any time in the foreseeable future.

The WWTP produces a high-quality effluent. For example, in 2019-2020 data the average effluent $CBOD_5$ and TSS were 7.15 mg/l and 4.58 mg/l respectively. There were no effluent violations found in that data. Tables 7-16 thru 7-21, provide flow and analytical DMR data respectively.

**Table 7-16**
**Muddy Creek WWTP 2019 - 2020 Flows (GPD)**

| Month | Monthly Average | | Daily Maximum | |
|---|---|---|---|---|
| | Influent (gpd) | Effluent (gpd) | Influent (gpd) | Effluent (gpd) |
| Jun | 92,000 | 94,000 | 148,000 | 227,000 |
| Jul | 57,000 | 46,000 | 96,000 | 84,000 |
| Aug | 49,000 | 45,000 | 56,000 | 52,000 |
| Sep | 50,000 | 32,000 | 58,000 | 50,000 |
| Oct | 53,000 | 41,000 | 71,000 | 89,000 |
| Nov | 79,000 | 68,000 | 198,000 | 194,000 |
| Dec | 114,000 | 134,000 | 344,000 | 207,000 |
| Jan | 118,000 | 105,000 | 182,000 | 230,000 |
| Feb | 135,000 | 129,000 | 278,000 | 250,000 |
| Mar | 111,000 | 114,000 | 236,000 | 262,000 |
| Apr | 103,000 | 99,000 | 208,000 | 243,000 |
| May | 106,000 | 107,000 | 251,000 | 269,000 |
| Average | 88,918 | 84,500 | --- | --- |
| Maximum | --- | 134,000 | 344,000 | 269,000 |

**Table 7-17**
**Muddy Creek WWTP - Performance Data, June 2019 through May 2020**

| | TSS | | | | | | |
|---|---|---|---|---|---|---|---|
| | Monthly Avg. | | | Weekly Max. | | Mo. Avg. | Wk. Max. |
| 2019-2020 | Influent (mg/l) | Effluent (mg/l) | % rem | Influent (mg/l) | Effluent (mg/l) | Effluent (ppd) | Effluent (ppd) |
| Jun | 452 | 2.25 | 99 | 969 | 4 | 1.11 | 1.6 |
| Jul | 581 | 1.4 | 99 | 805 | 2 | 0.47 | 0.95 |
| Aug | 433 | 7 | 98 | 803 | 14 | 2.2 | 3.8 |
| Sep | 989 | 3.5 | 99 | 2,008 | 9 | 0.91 | 2.33 |
| Oct | 219 | 3 | 99 | 380 | 4 | 0.82 | 1.2 |
| Nov | 306 | 4 | 99 | 648 | 8 | 1.61 | 3.07 |
| Dec | 175 | 4.25 | 98 | 212 | 5 | 4.34 | 6.9 |
| Jan | 190 | 4 | 98 | 396 | 11 | 3.99 | 12.94 |
| Feb | 577 | 11.8 | 98 | 1,781 | 25 | 16.82 | 35.03 |
| Mar | 273 | 5.25 | 98 | 440 | 11 | 4.9 | 10.7 |
| Apr | 442 | 4.8 | 99 | 721 | 16 | 2.96 | 10.54 |
| May | 256 | 3.75 | 98 | 468 | 7 | 4.96 | 14.07 |
| Avg | 408 | 4.58 | 99 | --- | --- | 3.76 | --- |
| Max | --- | --- | --- | 2,008 | 25 | --- | 35.03 |
| Limit | report | 30 | 85 | report | 45 | 50.04 | 75.06 |
| Violations | --- | 0 | 0 | --- | 0 | 0 | 0 |

TSS – Stands for Total Suspended Solids
ppd - Stands for Pounds Per Day

**Table 7-18**
**Muddy Creek WWTP - Performance Data (Continued)**

| | CBOD5 | | | | | | |
|---|---|---|---|---|---|---|---|
| | Monthly Avg. | | | Weekly Max. | | Mo. Avg. | Wk. Max. |
| 2019-2020 | Influent (mg/l) | Effluent (mg/l) | % rem | Influent (mg/l) | Effluent (mg/l) | Effluent (ppd) | Effluent (ppd) |
| Jun | 292 | 4.75 | 98 | 533 | 6 | 2.6 | 4 |
| Jul | 417 | 7.2 | 98 | 492 | 23 | 1.97 | 5.37 |
| Aug | 967 | 10.5 | 99 | 13.6 | 27 | 3.66 | 10.36 |
| Sep | 522 | 3.5 | 99 | 926 | 5 | 0.93 | 1.3 |
| Oct | 432 | 3.8 | 99 | 603 | 5 | 1.05 | 1.16 |
| Nov | 378 | 4 | 99 | 495 | 6 | 1.65 | 2.17 |
| Dec | 173 | 3 | 98 | 331 | 3 | 3 | 5.18 |
| Jan | 224 | 5.8 | 97 | 442 | 17 | 4.23 | 10.63 |
| Feb | 454 | 12.5 | 97 | 898 | 19 | 14.18 | 26.62 |
| Mar | 327 | 4.8 | 99 | 420 | 6 | 4.1 | 6.2 |
| Apr | 703 | 17.2 | 98 | 1,050 | 21 | 11.6 | 18.92 |
| May | 427 | 8.75 | 98 | 661 | 18 | 8.16 | 14.07 |
| Avg | 443 | 7.15 | 98 | --- | --- | 4.76 | --- |
| Max | --- | --- | -- | 1,050 | 27 | --- | 26.62 |
| Limit | report | 20 | 85 | report | 30 | 33.36 | 50.04 |
| Violations | --- | 0 | 0 | --- | 0 | 0 | 0 |

ppd - Stands for Pounds Per Day
CBOD5 – Stands for Biochemical Oxygen Demand (Carbonaceous) in 5 days

**Table 7-19**
**Muddy Creek WWTP - Performance Data (Continued)**

| | pH - min | pH - max | D.O. | E. coli | | Total Res. Chlorine | |
|---|---|---|---|---|---|---|---|
| 2019-2020 | Wk. Effluent (S.U.) | Wk. Effluent (S.U.) | Weekly Effluent (mg/l) | 30-d G.M Effluent (#/100 ml) | 7-d G.M Effluent (mg/l) | Mo. Avg. Effluent (mg/l) | Max. Day Effluent (mg/l) |
| Jun | 7.08 | 7.73 | 8.03 | 6.27 | 78.8 | NODI B | NODI B |
| Jul | 7.09 | 7.84 | 7.11 | 2.1 | 41.4 | NODI B | NODI B |
| Aug | 6.94 | 7.61 | 7.41 | 1 | 1 | NODI B | NODI B |
| Sep | 6.88 | 7.56 | 7.1 | 1 | 1 | NODI B | NODI B |
| Oct | 6.89 | 7.69 | 7.18 | 1.84 | 21.6 | NODI B | NODI B |
| Nov | 7 | 7.66 | 9.29 | 1.32 | 3.1 | NODI B | NODI B |
| Dec | 6.92 | 7.73 | 8.39 | 1.86 | 12 | NODI B | NODI B |
| Jan | 7.09 | 8.04 | 8.42 | 4.6 | 14.6 | NODI B | NODI B |
| Feb | 7.07 | 7.48 | 8.12 | 1.88 | 6.3 | NODI B | NODI B |
| Mar | 7.05 | 7.8 | 7.81 | 1.42 | 4.1 | NODI B | NODI B |
| Apr | 7.05 | 7.66 | 8.13 | 1 | 1 | NODI B | NODI B |
| May | 7.15 | 7.84 | 7.44 | 2.92 | 18.1 | NODI B | NODI B |
| Avg | --- | --- | --- | --- | --- | NODI B | --- |
| Min | 6.88 | --- | 7.10 | --- | --- | --- | --- |
| Max | --- | 8.04 | --- | 6.27 | 78.8 | --- | NODI B |
| Limit | 6.0 | 9.0 | 7 | 130 | 240 | 0.011 | 0.019 |
| Violations | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

NODI B - Stands for Below Detection Limit/No Detection
D.O. – Stands for Dissolved Oxygen
S.U. - Stands for Standard Units
30 d G.M. - Stands for 30 Day Geometric Mean
7 d G.M. - Stands for 7 Day Geometric Mean

**Table 7-20**
**Muddy Creek WWTP - Performance Data (Continued)**

| 2019-2020 | NH3-N | | | | | | Total N-N | |
|---|---|---|---|---|---|---|---|---|
| | Mo. Avg. Influent (mg/l) | Max. Day Influent (mg/l) | Mo. Avg. Effluent (mg/l) | Max. Day Effluent (mg/l) | Mo. Avg. Effluent (mg/l) | Max. Day Effluent (mg/l) | Mo. Avg. Effluent (mg/l) | Max. Day Effluent (mg/l) |
| Jun | --- | --- | 0.25 | 0.25 | --- | --- | 6.07 | 9.8 |
| Jul | 51.7 | 60.9 | 0.26 | 0.3 | --- | --- | 7.25 | 11.3 |
| Aug | 77.1 | 89.2 | 0.25 | 0.25 | --- | --- | 8.91 | 10.6 |
| Sept | 76 | 87.3 | 0.25 | 0.25 | --- | --- | 21.25 | 23.6 |
| Oct | 64 | 83.9 | 0.25 | 0.25 | --- | --- | 28.72 | 33.2 |
| Nov | 52.3 | 67.3 | --- | --- | 0.27 | 0.32 | 29.83 | 34.8 |
| Dec | 24.1 | 32.9 | --- | --- | 0.88 | 1.97 | 13.87 | 19.5 |
| Jan | 30.9 | 41.5 | --- | --- | 0.25 | 0.25 | 15.18 | 20.5 |
| Feb | 28.5 | 46.6 | --- | --- | 0.72 | 1.81 | 16.74 | 23 |
| Mar | 28 | 50.9 | --- | --- | 0.26 | 0.27 | 16.23 | 20.2 |
| Apr | 43.2 | 67.1 | --- | --- | 0.85 | 2.28 | 7.48 | 9.02 |
| May | 30.9 | 46.7 | 0.6 | 0.96 | --- | --- | 6.55 | 9.6 |
| Avg | 46.1 | --- | 0.31 | --- | 0.54 | --- | 14.44 | --- |
| Max | --- | 89.2 | --- | 0.96 | --- | 2.28 | --- | 34.8 |
| Limit | report | report | 4 | 6 | 10 | 15 | report | report |
| Violations | 0 | 0 | 0 | 0 | 0 | 0 | --- | --- |

NH3-N – Stands for Ammonia-Nitrogen and the limits are based on which season the samples are taken
Total N-N - Stands for Total Nitrogen as N
mg/l - Stands for Milligrams per Liter

**Table 7-21**
**Muddy Creek WWTP - Performance Data (Continued)**

| 2019-2020 | Total P-P | | | |
|---|---|---|---|---|
| | Monthly Avg. Influent (mg/l) | Max. Day Influent (mg/l) | Monthly Avg. Effluent (mg/l) | Max. Day Effluent (mg/l) |
| Jun | --- | --- | 2.43 | 3.06 |
| Jul | 3.88 | 5.03 | 4.45 | 5.69 |
| Aug | 6.4 | 9.2 | 5.54 | 6.29 |
| Sept | 6.95 | 7.26 | 6.15 | 6.92 |
| Oct | 6.39 | 7.13 | 5.11 | 6.54 |
| Nov | 4.51 | 5.72 | 3.93 | 5.1 |
| Dec | 2.2 | 3.33 | 1.84 | 2.41 |
| Jan | 2.68 | 3.16 | 2.46 | 3.13 |
| Feb | 3.79 | 7.09 | 2.18 | 3.06 |
| Mar | 3.05 | 5.91 | 2.61 | 2.84 |
| Apr | 4.08 | 6.25 | 2.87 | 4.25 |
| May | 2.78 | 4.75 | 1.66 | 3.41 |
| Avg | 4.41 | --- | 3.44 | --- |
| Max | --- | 9.2 | --- | 6.92 |
| Limit | report | report | Report | report |
| Violations | --- | --- | --- | --- |

Total P-P - Stands for Total Phosphorus as P

## MOBERLY SHELL

| | |
|---|---|
| Permit Number: | KY0098175 |
| Agency Interest No.: | 2800 |
| Owner: | EFS Moberly, LLC |
| Receiving Waters: | Unnamed Tributary to Muddy Creek |
| Effective Date: | 8/1/2019 |
| Expire Date: | 7/31/2024 |
| Average Daily Flow: | 0.0007 MGD (From Last 12 Months Average) |
| Design Flow: | 0.0010 MGD |
| Treatment: | Activated Sludge<br>Chlorine Disinfection |
| Effluent Limits: | See attached permit |

The age of the Moberly Shell Sewage Treatment plant is unknown.

The WWTP generally produces a high-quality effluent. For example, in the 2019-2020 data, the average effluent $CBOD_5$ and TSS were 7 mg/l and 6 mg/l respectively. Furthermore, no effluent violations occurred in that data. Tables 7-22 thru 7-25, provide flow and analytical DMR data respectively.

**Table 7-22**
**Moberly Shell WWTP – 2nd Quarter 2019 through 1st Quarter 2020 Flows**

| Date | Flow | |
|---|---|---|
| | Month Avg. (gpd) | Daily Max. (gpd) |
| 2nd Q 2019 | 700 | 700 |
| 3rd Q 2019 | 720 | 720 |
| 4th Q 2019 | 700 | 700 |
| 1st Q 2020 | 720 | 720 |
| Average | 710 | --- |
| Maximum | --- | 720 |

## Table 7-23
## Moberly Shell WWTP – 2nd Qtr. 2019 through 1st Qtr. 2020 Performance Data

| | pH - min | pH - max | D.O. | Total Res. Chlorine | | E. coli | |
|---|---|---|---|---|---|---|---|
| Date | Mo. Effluent (S.U.) | Mo. Effluent (S.U.) | Mo. Min. Effluent (mg/l) | Mo. Avg. Effluent (mg/l) | Day Max. Effluent (mg/l) | 30-d G.M Effluent (#/100 ml) | 7-d G.M Effluent (#/100 ml) |
| 2nd Q 2019 | 7.1 | 7.1 | 7 | 0.01 | 0.01 | <1 | <1 |
| 3rd Q 2019 | 7.1 | 7.1 | 7 | 0.01 | 0.01 | <1 | <1 |
| 4th Q 2019 | 7.5 | 7.5 | 7.1 | 0.01 | 0.01 | <1 | <1 |
| 1st Q 2020 | 7.1 | 7.1 | 7 | NODI B | NODI B | <1 | <1 |
| Avg | --- | --- | --- | 0.01 | --- | --- | --- |
| Min | 7.1 | --- | 7 | --- | --- | --- | --- |
| Max | --- | 7.5 | --- | --- | 0.01 | <1 | <1 |
| Limit | 6.0 | 9.0 | 7.0 | 0.011 | 0.019 | 130 | 240 |
| Violations | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

NODI B stands for Below Detection Limit/No Detection
D.O. – Stands for Dissolved Oxygen
S.U. - Stands for Standard Units

## Table 7-24
## Moberly Shell WWTP – Performance Data (Continued)

| | TSS (Effluent) | | | | CBOD5 (Effluent) | | | |
|---|---|---|---|---|---|---|---|---|
| Date | Mo. Avg. (mg/l) | Max. Wk. (mg/l) | Mo. Avg. (ppd) | Wk. Avg. (ppd) | Mo. Avg. (mg/l) | Max. Wk. (mg/l) | Mo. Avg. (ppd) | Wk. Avg. (ppd) |
| 2nd Q 2019 | 9 | 9 | 0.052 | 0.052 | 6 | 6 | 0.035 | 0.035 |
| 3rd Q 2019 | 10 | 10 | | | 5 | 5 | | |
| 4th Q 2019 | 4 | 4 | | | 14 | 14 | | |
| 1st Q 2020 | <2 | <2 | | | <3 | <3 | | |
| Avg | 6 | --- | 0.052 | 0.052 | 7 | --- | 0.035 | 0.035 |
| Max | --- | 10 | --- | --- | --- | 14 | --- | --- |
| Limit | 30 | 45 | 0.25 | 0.37 | 30 | 45 | 0.25 | 0.37 |
| Violations | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

NODI B stands for Below Detection Limit/No Detection
TSS – Stands for Total Suspended Solids
CBOD5 – Stands for Biochemical Oxygen Demand (Carbonaceous) in 5 days

**Table 7-25**
**Moberly Shell WWTP – Performance Data (Continued)**

| | NH3-N Season ID=1 (Effluent) | | | | NH3-N Season ID=2 (Effluent) | | | |
|---|---|---|---|---|---|---|---|---|
| Date | Mo. Avg. (mg/l) | Day Max. (mg/l) | Mo. Avg. (ppd) | Wk. Avg. (ppd) | Mo. Avg. (mg/l) | Day Max. (mg/l) | Mo. Avg. (ppd) | Wk. Avg. (ppd) |
| 2nd Q 2019 | 0.28 | 0.28 | 0.0016 | 0.0016 | NODI 9 | NODI 9 | NODI 9 | NODI 9 |
| 3rd Q 2019 | 0.34 | 0.34 | | | NODI 9 | NODI 9 | | |
| 4th Q 2019 | NODI 9 | NODI 9 | | | <0.05 | <0.05 | | |
| 1st Q 2020 | NODI 9 | NODI 9 | | | <0.05 | <0.05 | | |
| Avg | 0.31 | --- | 0.0016 | 0.0016 | <0.05 | --- | NODI 9 | NODI 9 |
| Max | --- | 0.34 | --- | --- | --- | <0.05 | --- | --- |
| Limit | 4 | 6 | 0.03 | 0.05 | 10 | 15 | 0.08 | 0.12 |
| Violations | 0 | 0 | 0 | 0 | 0 | 0 | | |

NODI 9 stands for Conditional Monitoring – Not Required This Period
NH3-N – Stands for Ammonia-Nitrogen and the limits are based on which season the samples are taken
ppd - Stands for Pounds Per Day

## WACO ELEMENTARY SCHOOL

| | |
|---|---|
| Permit Number: | KY0074551 |
| Agency Interest No.: | 35390 |
| Owner: | Madison County Board of Education |
| Receiving Waters: | Sand Springs Branch |
| Effective Date: | 1/1/2018 |
| Expire Date: | 12/31/2022 |
| Average Daily Flow: | 0.003 MGD (From Last 12 Months Average) |
| Design Flow: | 0.009 MGD |
| Treatment: | Activated Sludge<br>Chlorine Disinfection |
| Effluent Limits: | See attached permit |

The age of the Waco Elementary Sewage Treatment plant is unknown.

With respect to secondary treatment, the WWTP generally produces a high-quality effluent. For example, in 2019 and 2020 the average effluent $CBOD_5$ and TSS were 12 mg/l and 4 mg/l respectively.

Tables 7-26 thru 7-29, provide flow and analytical DMR data respectively.

**Table 7-26**
**Waco Elementary School WWTP – Flow April 2019 thru June 2020**

| Date | Flow (Effluent) | |
|---|---|---|
| | Monthly Avg. (gpd) | Max. Wk. (gpd) |
| 3rd Q 2019 | 4,274 | 4,274 |
| 4th Q 2019 | 2,619 | 2,619 |
| 1st Q 2020 | 2,719 | 2,719 |
| 2nd Q 2020 | 1,556 | 1,556 |
| Average | 2,792 | --- |
| Maximum | --- | 4,274 |

**Table 7-27**
**Waco Elementary School WWTP - Plant Performance Data, 2019 - 2020**

| Date | TSS (Effluent) | | CBOD5 (Effluent) | |
|---|---|---|---|---|
| | Mo. Avg. (mg/l) | Max. Wk. (mg/l) | Mo. Avg. (mg/l) | Max. Wk. (mg/l) |
| 3rd Q 2019 | 3 | 3 | 11 | 11 |
| 4th Q 2019 | 2 | 2 | 6 | 6 |
| 1st Q 2020 | 6 | 6 | 26 | 26 |
| 2nd Q 2020 | 3 | 3 | 5 | 5 |
| Avg | 4 | --- | 12 | --- |
| Max | --- | 6 | --- | 26 |
| Limit | 30 | 45 | 30 | 45 |
| Violations | 0 | 0 | 0 | 0 |

**Table 7-28**
**Waco Elementary School WWTP - Plant Performance Data (Continued)**

| Date | NH3-N Season 1 (Effluent) | | NH3-N Season 2 (Effluent) | |
|---|---|---|---|---|
| | Mo. Avg. (mg/l) | Daily Max. (mg/l) | Mo. Avg. (mg/l) | Daily Max. (mg/l) |
| 3rd Q 2019 | <=0.25 | <=0.25 | NODI 9 | NODI 9 |
| 4th Q 2019 | <=0.25 | <=0.25 | NODI 9 | NODI 9 |
| 1st Q 2020 | NODI 9 | NODI 9 | <0.25 | <0.25 |
| 2nd Q 2020 | 0.44 | 0.44 | NODI 9 | NODI 9 |
| Avg | 0.31 | ---- | <0.25 | ---- |
| Max | --- | 0.44 | ---- | <0.25 |
| Limit | 4 | 6 | 10 | 15 |
| Violations | 0 | 0 | 0 | 0 |

**Table 7-29**
**Waco Elementary School WWTP - Plant Performance Data (Continued)**

| | pH Min. | pH Max. | D.O. | Total Res. Chlorine | | E. coli | |
|---|---|---|---|---|---|---|---|
| Date | Month Effluent (S.U.) | Month Effluent (S.U.) | Month Min. Effluent (mg/l) | Month Avg. Effluent (mg/l) | Day Max. Effluent (mg/l) | 30-d G.M Effluent (#/100 ml) | 7-d G.M Effluent (#/100 ml) |
| 3rd Q 2019 | 6.46 | 7.39 | 8.22 | 0 | 0 | 1 | 1 |
| 4th Q 2019 | 7.22 | 7.22 | 8.94 | 0 | 0 | 70 | 70 |
| 1st Q 2020 | 6.94 | 6.94 | 11.27 | 0 | 0 | 2 | 2 |
| 2nd Q 2020 | 7.41 | 7.41 | 10.08 | 0 | 0 | 2 | 2 |
| Avg | --- | --- | --- | 0 | --- | --- | --- |
| Min | 6.46 | ---- | 8.22 | --- | --- | --- | --- |
| Max | ---- | 7.41 | ---- | --- | 0 | 70 | 70 |
| Limit | 6.0 | 9.0 | 7.0 | 0.011 | 0.019 | 130 | 240 |
| Violations | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

D.O. – Stands for Dissolved Oxygen

## BYBEE GROCERY

| | |
|---|---|
| Permit Number: | KY0099317 |
| Agency Interest No.: | 2811 |
| Owner: | Bybee Quick Stop |
| Receiving Waters: | Unnamed Tributary to Drowning Creek |
| Effective Date: | 7/1/2020 |
| Expire Date: | 6/30/2025 |
| Average Daily Flow: | 0.0004 MGD (From Last 12 Months Average) |
| Design Flow: | 0.0025 MGD |
| Treatment: | Bar Screen<br>Activated Sludge<br>Chlorine Disinfection<br>Dechlorination |
| Effluent Limits: | See attached permit |

The age of the Bybee Grocery Sewage Treatment plant is unknown.

The WWTP generally produces a high-quality effluent. For example, in the 2019-2020 data, the average effluent $CBOD_5$ and TSS were 7 mg/l and 8.1 mg/l respectively. Furthermore, no effluent violations occurred that year. Tables 7-30 thru 7-33, provide flow and analytical DMR data respectively.

**Table 7-30**
**Bybee Grocery WWTP – 2nd Quarter 2019 through 1st Quarter 2020 Flows**

| Date | Flow (Effluent) | |
|---|---|---|
| | Mo. Avg (gpd) | Max Wk. (gpd) |
| 2nd Q 2019 | 400 | 400 |
| 3rd Q 2019 | 400 | 500 |
| 4th Q 2019 | 400 | 400 |
| 1st Q 2020 | 500 | 600 |
| Average | 425 | --- |
| Maximum | --- | 600 |

## Table 7-31
## Bybee Grocery WWTP – 2nd Qtr. 2019 through 1st Qtr. 2020 Performance Data

| | TSS (Effluent) | | | | CBOD5 (Effluent) | | | |
|---|---|---|---|---|---|---|---|---|
| Date | Mo. Avg. (mg/l) | Wk. Avg. (mg/l) | Mo. Avg. (ppd) | Wk. Avg. (ppd) | Mo. Avg. (mg/l) | Wk. Avg. (mg/l) | Mo. Avg. (ppd) | Wk. Avg. (ppd) |
| 2nd Q 2019 | 10 | 10 | 0.03 | 0.03 | 15 | 15 | 0.05 | 0.05 |
| 3rd Q 2019 | 3 | 3 | 0.01 | 0.01 | 3 | 3 | 0.01 | 0.01 |
| 4th Q 2019 | 14 | 14 | 0.05 | 0.05 | 5 | 5 | 0.02 | 0.02 |
| 1st Q 2020 | 5.4 | 5.4 | 0.022 | 0.022 | 3 | 3 | 0.012 | 0.012 |
| Avg | 8.1 | 8.1 | 0.028 | 0.028 | 7 | 7 | 0.023 | 0.023 |
| Limit | 30 | 45 | 0.63 | 0.94 | 30 | 45 | 0.63 | 0.94 |
| Violations | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

TSS – Stands for Total Suspended Solids
CBOD5 – Stands for Biochemical Oxygen Demand (Carbonaceous) in 5 days
ppd - Stands for Pounds Per Day

## Table 7-32
## Bybee Grocery WWTP – Performance Data (Continued)

| | NH3-N Season ID=1 (Effluent) | | | | NH3-N Season ID=2 (Effluent) | | | |
|---|---|---|---|---|---|---|---|---|
| Date | Mo. Avg. (mg/l) | Wk. Avg. (mg/l) | Mo. Avg. (ppd) | Wk. Avg. (ppd) | Mo. Avg. (mg/l) | Wk. Avg. (mg/l) | Mo. Avg. (ppd) | Wk. Avg. (ppd) |
| 2nd Q 2019 | 0.25 | 0.25 | 0.003 | 0.003 | NODI 9 | NODI 9 | NODI 9 | NODI 9 |
| 3rd Q 2019 | 0.25 | 0.25 | 0.008 | 0.008 | NODI 9 | NODI 9 | NODI 9 | NODI 9 |
| 4th Q 2019 | 0.25 | 0.25 | 0.008 | 0.008 | NODI 9 | NODI 9 | NODI 9 | NODI 9 |
| 1st Q 2020 | NODI 9 | NODI 9 | NODI 9 | NODI 9 | 0.25 | 0.25 | 0.001 | 0.001 |
| Avg | 0.25 | 0.25 | 0.006 | 0.006 | 0.25 | 0.25 | 0.001 | 0.001 |
| Limit | 4 | 6 | 0.08 | 0.13 | 10 | 15 | 0.21 | 0.31 |
| Violations | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

NODI 9 - Stands for Conditional Monitoring – Not Required this Period
ppd - Stands for Pounds Per Day
NH3-N – Stands for Ammonia-Nitrogen and the limits are based on which season the samples are taken

**Table 7-33**
**Bybee Grocery WWTP – Performance Data (Continued)**

| | pH Min. | pH Max. | D.O. | Total Res. Chlorine | | E. coli | |
|---|---|---|---|---|---|---|---|
| Date | Monthly Effluent (S.U.) | Monthly Effluent (S.U.) | Month Min. Effluent (mg/l) | Mo. Avg. Effluent (mg/l) | Wk. Avg. Effluent (mg/l) | 30-d G.M Effluent (#/100 ml) | 7-d G.M Effluent (#/100 ml) |
| 2nd Q 2019 | 7.44 | 7.44 | 8.33 | NODI B | NODI B | 1 | 1 |
| 3rd Q 2019 | 6.86 | 6.86 | 7.24 | NODI B | NODI B | 1 | 1 |
| 4th Q 2019 | 7.22 | 7.22 | 7.27 | NODI B | NODI B | 1 | 1 |
| 1st Q 2020 | 7.78 | 7.78 | 9.37 | NODI B | NODI B | 2 | 2 |
| Avg | --- | --- | --- | NODI B | NODI B | --- | --- |
| Min | 6.86 | ---- | 7.24 | --- | --- | --- | --- |
| Max | ---- | 7.78 | ---- | --- | --- | 2 | 2 |
| Limit | 6.0 | 9.0 | 7.0 | 0.011 | 0.019 | 130 | 240 |
| Violations | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

D.O. – Stands for Dissolved Oxygen
S.U. - Stands for Standard Units
NODI B - Stands for Below Detection Limit/No Detection

## KINGSTON ELEMENTARY

| | |
|---|---|
| Permit Number: | KY0074543 |
| Agency Interest No.: | 35391 |
| Owner: | Madison County Board of Education |
| Receiving Waters: | Unnamed Tributary to Hays Fork |
| Effective Date: | 1/1/2018 |
| Expire Date: | 12/31/2022 |
| Average Daily Flow: | 0.002 MGD (From Last 12 Months Average) |
| Design Flow: | 0.010 MGD |
| Treatment: | Activated Sludge<br>Disinfection (Chlorine) |
| Effluent Limits: | See attached permit |

The age of the Kingston Elementary Sewage Treatment plant is unknown.

The WWTP generally produces a high-quality effluent. For example, in the 2019-2020 data, the average effluent $CBOD_5$ and TSS were 9 mg/l and 3 mg/l respectively. Furthermore, no effluent violations occurred that year. Tables 7-34 thru 7-37, provide flow and analytical DMR data respectively.

**Table 7-34**
**Kingston Elementary WWTP – 3rd Quarter 2019 through 2nd Quarter 2020 Flows**

| Date | Flow (Effluent) | |
|---|---|---|
| | Mo. Avg. (gpd) | Max. Wk. (gpd) |
| 3rd Q 2019 | 3,540 | 3,540 |
| 4th Q 2019 | 1,970 | 1,970 |
| 1st Q 2020 | 1,555 | 1,555 |
| 2nd Q 2020 | 1,273 | 1,273 |
| Average | 2,085 | --- |
| Maximum | --- | 3,540 |

## Table 7-35
## Kingston Elem. WWTP – 2nd Qtr. 2019 through 2nd Qtr. 2020 Performance Data

| | TSS | | CBOD5 | |
|---|---|---|---|---|
| Date | Mo. Avg. (mg/l) | Max. Wk. (mg/l) | Mo. Avg. (mg/l) | Max. Wk. (mg/l) |
| 3rd Q 2019 | 2 | 2 | 3 | 3 |
| 4th Q 2019 | 3 | 3 | 18 | 18 |
| 1st Q 2020 | 3 | 3 | 6 | 6 |
| 2nd Q 2020 | 4 | 4 | 7 | 7 |
| Avg | 3 | --- | 9 | --- |
| Max | --- | 4 | --- | 18 |
| Limit | 30 | 45 | 30 | 45 |
| Violations | 0 | 0 | 0 | 0 |

TSS – Stands for Total Suspended Solids
CBOD5 – Stands for Biochemical Oxygen Demand (Carbonaceous) in 5 days

## Table 7-36
## Kingston Elementary WWTP – Performance Data (Continued)

| | pH Min. | pH Max. | D.O. | Total Res. Chlorine | | E. coli | |
|---|---|---|---|---|---|---|---|
| Date | Mo. Effluent (S.U.) | Mo. Effluent (S.U.) | Mo. Min. Effluent (mg/l) | Mo. Avg. Effluent (mg/l) | Day Max. Effluent (mg/l) | 30-d G.M Effluent (#/100 ml) | 7-d G.M Effluent (#/100 ml) |
| 3rd Q 2019 | 6.38 | 7.08 | 7.621 | <=0.01 | <=0.01 | <=1 | <=1 |
| 4th Q 2019 | 7.51 | 7.51 | 8.18 | 0.01 | 0.01 | <=1 | <=1 |
| 1st Q 2020 | 6.93 | 6.93 | 11.26 | <=0.01 | <=0.01 | <1 | <1 |
| 2nd Q 2020 | 7.08 | 7.08 | 11.19 | <=0.01 | <=0.01 | <1 | <1 |
| Avg | --- | --- | --- | 0.01 | --- | --- | --- |
| Min | 6.38 | --- | 7.62 | --- | --- | --- | --- |
| Max | --- | 7.51 | --- | --- | 0.01 | <1 | <1 |
| Limit | 6.0 | 9.0 | 7.0 | 0.011 | 0.019 | 130 | 240 |
| Violations | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

D.O. – Stands for Dissolved Oxygen
S.U. - Stands for Standard Units

**Table 7-37**
**Kingston Elementary WWTP – Performance Data (Continued)**

| Date | NH3-N Season ID=1 (Effluent) | | NH3-N Season ID=2 (Effluent) | |
|---|---|---|---|---|
| | Mo. Avg. (mg/l) | Day Max. (mg/l) | Mo. Avg. (mg/l) | Day Max. (mg/l) |
| 3rd Q 2019 | <=0.25 | <=0.25 | NODI 9 | NODI 9 |
| 4th Q 2019 | <=0.25 | <=0.25 | NODI 9 | NODI 9 |
| 1st Q 2020 | NODI 9 | NODI 9 | <0.25 | <0.25 |
| 2nd Q 2020 | 0.38 | 0.38 | NODI 9 | NODI 9 |
| Avg | 0.38 | --- | <0.25 | --- |
| Max | --- | 0.38 | --- | <0.25 |
| Limit | 4 | 6 | 10 | 15 |
| Violations | 0 | 0 | 0 | 0 |

NH3-N – Stands for Ammonia-Nitrogen and the limits are based on which season the samples are taken
NODI 9 - Stands for Conditional Monitoring – Not Required this Period

## Current and Projected Flows

Flow per household was calculated for the four collection systems/treatment plants discussed in Chapter 6. Both long-term and maximum monthly average flows are shown in Table 8-1. Totaling the data for the four collection systems/treatment plants the average gpd per household is 230.1 gpd. The maximum monthly average flow per household is 333.2 gpd.

A second flow basis method was taken using the 2010 Census figure of 2.45 persons per household (from Table 4-3) applied to the 10-States design standard of 100 gallons per day per capita (gpcd). The resulting average daily flow per household is 245 gpd.

From the values determined above, the more conservative average flow per household of 333.2 gpd was used as the basis for flow projections and planning. This value not only includes average usage per household, but also a component for Inflow and Infiltration (I&I).

**Table 8-1**
**Flow Basis – Historical Data**

| Flow Basis Using Historical Data | | | | | |
|---|---|---|---|---|---|
| Description | No. Customers Homes | Flow | | Flow/Home | |
| | | 12 Mo. Rolling Avg. (gpd) | Max of Monthly Avg's 5/19-4/20 (gpd) | 12 Mo. Rolling Avg Per household (gpd/HH) | Max of Monthly Avg's per household (gpd/HH) |
| Regional WWTP | 1023 | 260,283 | 394,966 | 254.4 | 386.1 |
| Muddy Creek WWTP | 400 | 93,384 | 137,660 | 233.5 | 344.2 |
| Battlefield WWTP | 482 | 91,138 | 113,665 | 189.1 | 235.8 |
| Executive Park WWTP | 75 | 10,891 | 13,418 | 145.2 | 178.9 |
| Total | 1980 | 455,696 | 659,709 | 230.1 | 333.2 |

Note: see flows as shown Appendix Section 8-1 through Section 8-4.

## Projects in the 0-2 Year Planning Period Projected Flows

Both projects in the 0-2-year planning period are comprised of sewer extensions to serve residential areas. Boone Village is an existing already built out subdivision and the other project

at the Battlefield WWTP site will serve a major addition of 125 new lots in the existing Twin Lakes subdivision.

Flow from the Boone Village subdivision will go to the Regional WWTP and is calculated to be (70 connections at 333.2 g/hh/day =) 23,324 gal/day. This amount of additional flow when added to the 2019 average flow of 240,000 gal./day (263,324) is still only 26.3% of the Design Capacity of the Regional WWTP.

The additional 125 new lots proposed for the Twin Lakes Subdivision which will flow to the BF WWTP would generate (125 x 333.2 g/hh/day =) 41,650 gal/day. With the increased capacity of 214,000 gal/day of the BF plant, this would equate to 19%. Or to look at it another way the current average annual 2019 flow of 73,000 gal./day (from Table 2-1) plus this additional flow (114,650) is 54% of the increased design capacity.

A Waste Load Allocation letter from the Division of Water on the Battlefield WWTP upgrade is located in the Appendix Section 8-5.

**Projects in the 3-10 Year Planning Period Projected Flows**

The only major flow contributors in this Planning Period are Projects 3-10D & E.
Madison Village flow is currently going to the Regional Plant so rehabbing their collection system may only cause a slight increase in the flow as the lines are replaced and less flow escapes into the ground. Moberly Shell has an average flow of 700 gal./day, Waco Elem. Sch. has an average flow of 3,000 gal./day during the time school is in session.

Extending sewer service to Shady Hills Subdivision would add 127 new connections to the Regional WWTP flow. This would equate to 127 x 333.2 or 42,316 gal./day. This amount of flow along with Boone Village's flow would still only be 30.5% of the Design Capacity of the Regional WWTP.

The last project in this planning period is the proposed collection system west of I-75. This is a very subjective system and WWTP fueled by the new Duncannon Road Exit # 83 to I-75, the "under construction" realignment of KY 52 to meet this new interchange, a proposed new road from the relocated KY 52 to the Madison Co. Airport (Economy Road) as well as an Opportunity Zone overlay of this area west of I-75. At this point in time we have projected a 100,000 gal./day package WWTP to serve this area. Property could conceivably be rezoned in the future resulting in significant commercial and/or industrial uses. The collection system would be designed to deliver lows from this area to the proposed WWTP which would be located next to Silver Creek west of I-75.

**Projects in the 11-20 Year Planning Period Projected Flows**

There are six projects within this planning period. The first two are small projects to basically remove two package treatment plants from service. Bybee Quick Stop's flow will go to Muddy Creek WWTP. Kingston Elem. School's flow will be sent to Battlefield.

Three studies of the need to increase the design capacity of WWTP's and identify major improvements are listed in this time frame, however, the construction of any recommended improvements to the WWTP's would be slated for beyond 2040.

The last project is also an elimination of an existing package treatment plant. The 76 Truck Stop property at Exit 97 of I-75 is being auctioned in September 2020. This property and the package treatment plant have sat unused for many years. This property could be reactivated as a truck stop or repurposed to another use. The proposed collection system to serve this property would flow by gravity away from the interstate to Simpson Lane. At Simpson Lane a pump station would be installed to pump the flow back toward and under I-75 to an existing NMCSD pump station. That pump station would then pump the flow to the Regional WWTP. This is a long-term projection and the amount of flow generated would be an estimate not knowing the ultimate use or zoning of this property.

The greatest growth potential according to NMCSD would be near Exit 97 and Exit 95. These areas may see additional subdivisions develop because of the sale of the old truck stop at Exit 97 and to the east of Exit 95 in the area around the new elementary school.

**Summary of Projected Flows**

The primary focus of this Plan is the 0-2-year period, and the related construction projects. Future growth projections beyond this time frame are considered general indications of what might possibly be expected to occur. Thus, future projects/figures may be greatly impacted by the conceptual design of the rural growth areas beyond the initial phases and their future expandability.

**Industrial, Institutional and Commercial Flows**

As stated in Section 6 of this report, there are 31 commercial customers that are included in the total number of customers (total customers equal 1980 as of 2019). These commercial customers are spread across three plants, with 12 in the Battlefield service area, 9 in the

Regional Plant area and 10 in the service area of Muddy Creek. There are currently no industrial customers served by NMCSD.

The future demand for commercial or industrial customers is unknown, but based on the current listing, it is not considered substantial. The majority of the commercial customers reaching out to the rural areas are small gas station with a small assortment of groceries and snacks or a Dollar General type store that tends to have dual bathroom facilities and a possible small kitchen with grease trap.

An exception to this forecast would be development within the designated Opportunity Zone to the west of I-75 that may see commercial or industrial customer growth due to tax incentives of the Opportunity Zone and the proposed transportation improvements, no additional new employers of any scale are known to be considering locating within the PA.

**Infiltration and Inflow Estimates**

An analysis of the twelve months of flow and rainfall data for each of the four WWTP's are located in Appendix Section 8-1 through Section 8-4. Table 8-2 below summarizes the calculated I&I data from these WWTP's.

**Table 8-2 Inflow and Infiltration Calculations Summary**

| WWTP | 12 Mo. Avg. Flow (GPD) | Maximum of the Avg. Flows/Mo. | Total Population | Calc. Avg. Daily Flow per Capita (gppd) | Calc. Peak Inflow per Capita (gppd) |
|---|---|---|---|---|---|
| Regional WWTP | 260,283 | 394,966 | 2,506 | 104 | 153 |
| Muddy Creek WWTP | 93,384 | 137,660 | 980 | 95 | 99 |
| Battlefield WWTP | 91,138 | 113,665 | 1,181 | 77 | 104 |
| Executive Park WWTP | 10,891 | 13,418 | 184 | 59 | 88 |

The Calculated Average Daily Flow column is the 12-month average flow divided by the total population. The Calculated Peak Inflow per Capita is the Peak Inflow & Infiltration Day divided by the total population.

As the table above shows, the calculated Average Daily Flow (per person) are all under the 120 number that the EPA suggests as a benchmark for excessive infiltration. Anything above that number would suggest excessive infiltration. The table also shows that Peak Inflow per Capita numbers are under the 275 thresholds for excessive inflow.

In future project the NMCSD will utilize best management practices and materials to construct new sewers. This will continue to minimize issues with I&I in the system. From a Closed-Circuit Televising of the Madison Village subdivision, a good portion of the system was constructed

with 8” vitrified clay pipe and has experienced sags and settling that appear to be caused by improper pipe bedding. The system has been further damage by roots and posts over time. This is the driving force behind the habitation of this subdivision (Project #3-10A) that will reduce inflows in infiltration from this site.

**Waste Load Summary of Projected Flows**

Waste load is expected to be from residential customers with minor commercial (gas stations, convenience stores, churches, schools, etc.) and thus the existing WWTP’s could accommodate any minor additional waste load. Future flows going into the Regional WWTP or the Muddy Creek WWTP is expected to be of similar waste streams as the current stream, so unless something unusual is put on newly developed property the existing plant should be able to accommodate future flows and their associated waste loads.

The type of flow going to the proposed WWTP west of I-75 in the Duncannon area is not known at this time. A waste load allocation letter (WLA) will be submitted to DOW once the source, quantity and makeup of the flow is known.

The other area, north of Richmond at Exit 97 and surrounding area could be repurposed to a use other than residential use that may change the waste load to something other than residential flow. Until this property is sold and a zoning permit acquired, we cannot predict the waste load. This is in the long-term projection so the District will have some time to access the treatability of this waste stream. The flow will go to the Regional WWTP. Unless something unusual is put on this property the existing plant should be able to accommodate this flow and waste load.

The current Battlefield WWTP KPDES Permit #KY0102971 is located in the Appendix Section 7-2. Behind the Section 1 of this permit the effluent limitations for loading (lbs./day) and concentrations of the treated wastewater as well as the frequency and type of sampling required are shown. An updated Waste Load Allocation letter from the Division of Water dated June 8th, 2020 is included in Appendix Section 8-5. As would be expected, no changes to these requirements were included in the upgrade to the plant as the waste stream is the same.

**Projects Grouped by Types**

All of the projects proposed in this facilities plan for the Northern Madison County Sanitation District (NMCSD) fall broadly into three types of projects:

Type #1 Projects are improvement to existing completely built out subdivision that have failing septic systems within the subdivision. These systems have either individual on-site systems or a gravity network of collector sewers, pump stations and force mains. The Boone Village, Madison Village and Shady Hills (Projects #'s 0-2A, 3-10A and 3-10D respectively) all fit into this group. These projects are all shown on the DWG 9-1 "Regional WWTP Service Area" located in Appendix Section 9-1. This drawing shows all three proposed projects as they are located in the region and interconnected with the force mains and pump stations that direct wastewater to the WWTP. A sketch of the system is shown on drawing DWG 9-2 "Regional WWTP Flow Schematic" located in the Appendix Section 9-2 of this report.

Type #2 Projects include the elimination of existing package WWTP's and hooking into a Regionalized WWTP. The Moberly Shell, Waco Elementary, Bybee Quick Stop, Kingston Elementary, Exit 97's WWTP and potentially the Executive Park WWTP's (Project #s 3-10B, 3-10C, 11-20A, 11-20B, 11-20F and 11-20C respectively) would fall into this classification of projects. These projects are all shown on the drawings DWG 9-1 "Regional WWTP Service Area", DWG 9-3 "Muddy Creek WWTP Service Area" and the DWG 9-5 "Battlefield WWTP Service Area" located in the appendix to this report. These drawings show all six proposed projects as they are located in their region and interconnected with the force mains and pump stations that direct wastewater to the WWTP. A sketch of these systems is shown on drawings DWG 9-2 "Regional WWTP Flow Schematic", DWG 9-4 "Muddy Creek WWTP Flow Schematic" and DWG 9-6 "Battlefield WWTP Flow Schematic". All three schematics drawings are located in the Appendix to this report.

Type #3 Projects are the type that are studies of the need for a design capacity expansion or construction at the WWTP. The two Battlefield WWTP expansions (#0-2B and #11-20D Study), the Regional WWTP capacity increase (#11-20E Study) and the design of the new proposed WWTP west of I-75 (#11-20F) would all be examples of this type of project. The Battlefield WWTP expansion project involves the study of the potential to add the Executive Park WWTP into its treatment system or the upgrading of this plant to extend it useful life. The drawing DWG 9-7 "Executive Park WWTP Service Area" locates the plant and its interconnected force main

and pump station that direct wastewater to the WWTP. A sketch of this system is shown on drawings DWG 9-8 “Executive Park WWTP Flow Schematic”. Both drawings are located in the Appendix to this report.

No drawing of the proposed WWTP west of I-75 has been included. This plant’s location and collection system is unknown at this time but is planned to be located west of the KYTC proposed Item No. 7-8853.00 (KY 52 and Economy Road) construction and near Silver Creek. This plant will be designed to handle any new developments along this new road.

Alternatives for each of these three types of project will be evaluated below.

**Consideration of the No-Action Alternatives**

The three classifications of proposed projects will be analyzed for betterment by the No-Action Alternative. Each of the classifications will be described and reviewed.

**No-Action Alternative for the Type #1 Projects – Subdivisions**

The subdivisions to be provided new sewer services (Boone Village & Shady Hills) or where the existing collector sewer is to be replaced (Madison Village) all have instances of sewerage running in surface ditches and/or having foul odors within the subdivision. To take no action on these issues would of course be the least costly solution in terms of immediate capital outlay for these areas, but the environmental and health effects of these inactions will be very costly to the residents and the environment.

**No-Action Alternative for the Type #2 Projects – Private WWTP’s**

The five package plants could continue to be privately operated and maintained. The data from Section 7 of this report indicate that the private WWTP’s listed have a good track record of permit compliance with their discharge and treatment over the past 12 months. The costs to the environment and health of the community should not be affected because of the track record from last year’s data presented in Section 7 from these plants.

The operating expenses of each of these plants is unknown, but the fact that the operator would entertain the option of decommissioning an operating plant indicates that financially this option is potentially attractive. Three of these package plants are within NMCSD’s current service area, i.e. the Exit 97 WWTP (not operated for a number of years), Executive Park and Mobley Shell, while the other three projects would entail installing a short line extension. The extension of collection/pump station/force main lines to connect these plants has the potential to pick up additional customers for the NMCSD as well.

**No-Action Alternative for the Type #3 Projects – Plant Upgrade Studies and Projects**

This class will require significant investment in capital that if not undertaken will, of course not require the new capital. This would show up in opportunity lost as projects that could have been served by the plant expansion, had it been undertaken in a timely manner, could have supported the increase in population forecasted in Section 4 of this report.

The No Action alternative for the Battlefield WWTP is not a viable option. This alternative was discounted due to the plant currently operating near 70% of its design capacity. If no action was taken, then there could be a tap-on ban required as the plant approached its design capacity. This will be a negative impact on the District, due to the potential income lost from both tap-on fees and monthly user fees. This option was dismissed as not viable.

The WWTP west of I-75 project is solely based on the estimated increase in residential, commercial and industrial developments drawn to this area by the Kentucky Transportation Cabinet (KYTC) road improvement projects and the designation of the area as an Opportunity Zone. The primary projects are the roadway improvements from Duncannon Road to the Madison County Airport Road (Item #7-8853.00) but to a lesser degree, it may also service some of the road improvements near the Duncannon Road -KY 52 (KYTC Item #7-235.00) . These two projects as well as a third road widening on US 25 from the intersection of US 25 and US 412 to Pumpkin Run Road (Item #7-251.40) are all located on DWG 3-1.

Overall, this option would be the lowest capital outlay in all the project types reviewed but have significant impacts on the environment by allowing wastewater to continue to pollute the commonwealth's streams and rivers and new population expansion may not be served.

**Optimization Alternative of Existing Facilities**

The three classifications of proposed projects will be analyzed for betterment by utilizing Optimization at the facility. Each of the classifications will be described and reviewed to determine benefits.

**Optimization of Type #1 Projects – Subdivisions**

These areas have little or no ability to consider optimization of their wastewater treatment systems. They have failing infrastructure in the form of existing on-site septic systems or gravity collection lines that are susceptible to inflow and infiltration (I&I) mainly because of age and construction materials (often vitrified clay pipe). Even replacing the current septic systems with new ones would have the limitation of small lot size and poor soil conditions for ground perk (see DWG 5-1 General Geology's legend entitled Planning Guidance by Rock Unit Type). The "Septic Tank Absorption Fields" rating for the individual soil types is shown in the Appendix for

Section 5. This rating indicates that the soils found in Boone Village, Madison Village and Shady Hills are all classified as “Very Limited “. Therefore, optimization of the existing septic systems is generally not feasible due to the above-mentioned poor soil conditions and a history of failing septic systems as discussed in other sections of this report.

**Optimization of Type #2 Projects – Private WWTP’s**

These small package type plants are typically single source type facilities. For example, the Waco Elementary School plant was built and operated for the exclusive use of that school. Sooner or later this facility will reach the end of its useful life and start to fail. At that point the owner will need to determine if a replacement system will be feasible compared to the cost of the extension to the collection system in the community of Waco. The existing gravity system in the community collects wastewater for that area and then pumps that wastewater to the Muddy Creek WWTP for processing.

Two of the existing treatment plants in the planning area are privately owned, and two of the plants are owned by the Madison County School District. Their treatment capacities are one to two orders of magnitude less than what is offered by the larger regional type plants that they could be connected. Thus, the optimization of an individual package WWTP to include a larger area is not feasible and would not be able to achieve the desired treatment capacity or efficiency of the much larger facilities.

**Optimization of Type #3 Projects – Plant Upgrades**

Construction on the Regional WWTP was completed in 2008. It was constructed utilizing the current best practices. The expansion for this project may well include additional process trains in a separate structure as well as renewed or upgraded equipment in the existing facility. The Battlefield WWTP is much older and its current design treatment process can handle 0.114 MGD. The final construction phase could see this plant doubling in capacity, therefore optimizing the existing facility to obtain this magnitude of additional capacity is not feasible to achieve.

This option would seem to have very limited long-term impact on the ongoing pollution and would require a significant investment in capital for the individual homeowner or business.

**Regionalization Alternative of Existing Facilities**

The three classifications of proposed projects will be analyzed for betterment by the Regionalization of the wastewater treatment. Each of the classification’s current conditions will be described and reviewed.

**Regionalization of Type #1 Projects – Subdivisions**

Currently the Madison Village subdivision is served by a collection system that includes three pump stations that all feed to a fourth newer pump station that is connected to the Regional WWTP by force mains and gravity collectors. As discussed above the other two subdivision (Boone Village and Shade Hill) are currently served by individual septic systems at each house. These two locations would both benefit from the connection to the Regional WWTP. As stated before, the lot size in portions of these subdivision are too small and steep to provide for adequate drain field lines. A regional approach will see a combination of gravity collection and force mains to connect the individual houses to the Regional WWTP. Furthermore, regionalization will place the control and responsibility for sewage treatment, in the hands of a public sanitation district as opposed to large portions being privately owned, operated without continuous scrutiny and testing.

**Regionalization of Type #2 Projects – Private WWTP's**

These plants would similarly benefit from regionalization by redirecting flow from these individual entities and from any future sources, to a single point of treatment. As in the subdivisions discussed above, regionalization will place the control and responsibility for sewage treatment, in the hands of a public sanitation district as opposed to large portions (in this case individual package treatment systems) being privately owned, operated and maintained.

Consideration was given when including these types of private WWTP's into the Muddy Creek WWTP design capacity.

**Regionalization of Type #3 Projects – Plant Upgrades**

These projects are the regional facilities and the expansion of their current capacities will increase the facilities availability and allow additional subdivision to connect and take small package treatment facilities offline.

This alternative has the largest return on investment and centralizes the treatment of wastewater and allows continuous monitoring of the discharges. It will require significant investments in capital, but this investment will pay dividends in the reduction of pollution to the environment as well as a steady rate base to maintain the facilities well into the future.

**Decentralization Alternative of Existing Facilities**

The three classifications of proposed projects will be analyzed for betterment by the decentralization of the wastewater treatment. Each of the classification's current conditions will be described and reviewed.

**Decentralization of Type #1 Projects – Subdivisions**

As stated in the Regionalization discussion, Madison Village subdivision's wastewater flow already is pumped to a regional WWTP thru its collection system, but in the past, it had an onsite WWTP. This subdivision had a package treatment plant that utilized the active sludge process. The plant's design capacity was rated at 90,000 gallons per day. This plant encountered problems with collection line integrity and ammonia spikes in the effluent. This likely occurred because of an imbalance or upset within the nitrification process during treatment. This plant was decommissioned and replaced with a pump station (Madison Village Pump Station) and force main that transferred the wastewater to the Regional WWTP.

The other two subdivision have always had onsite septic tanks and have suffered from observed sewage at the surface of the ground and odors. Since both the Boone Village and Madison Village subdivision is completely built out, no additional space for individual lot drain field expansion is feasible.

**Decentralization of Type #2 Projects – Private WWTP's**

The private WWTP's are currently decentralized as they treat and discharge wastewater from a single source, usually an individual school or gas station/grocery. This type of project will therefore not be evaluated for further decentralization.

**Decentralization of Type #3 Projects – Plant Upgrades**

The WWTP's are all centralized facilities and setup to treat wastewater from a region of the planning area. As such, they will not be discussed in this decentralization section.

**Other Alternatives Considered**

As stated above, the No Action alternative for the Battlefield WWTP is not a viable option

Another alternative considered was to build a totally new concrete basin WWTP. Estimating the cost of a new plant at $8.00 per gallon would result in a cost of construction being $1,712,000. and a total project cost of over $2,000,000. This is a very significant increase over the estimated $150,000 cost of the relocation Boone Trace WWTP and its reconstruction on the Battlefield WWTP site. This option was dismissed as not viable.

The expansion the Battlefield WWTP (BF) by adding another steel package treatment unit was considered. This alternative was the selected alternative because of the lower cost, smaller footprint means less environmental impact and due to the fact that the plant to be moved in has the same treatment methodology, i.e. extended aeration as the existing Battlefield WWTP. The

District's operators are already accustomed to operating this type of plant. Keeping with the same process will increase efficiency over learning a new treatment methodology.

The items listed below are a summary of construction to relocate the Boone's Trace package WWTP (BT) to the Battlefield WWTP site.

The major steps related to rehabbing and relocating the BT plant to the BF site are:

- The BT plant was taken out of service when a pump station and force main was installed to pump the flow to the Regional WWTP at Jack's Creek. The BT plant will be cut into four sections for transport to the BF site.
- Excavate and pour a concrete slab at the BF site as a foundation for the BT package Plant. Detailed Plans and Specs for this work have already been submitted to KY DOW for approval. The approval of those plans and specifications are pending until this Regional Facility Plan has been approved.
- Place the four sections of the BT plant on the concrete slab and weld together.
- Sandblast and paint the exterior and interior of the steel plant
- Backfill, seed and straw the disturbed areas
- Replace all air drops and diffusers
- Place existing blower, pumps and motors from the BT site.
- Install electrical wiring and plumb all necessary connections to have the new treatment train operating.

An updated treatment process flow schematic that shows the existing and proposed waste flows though the WWTP is located in Appendix Section 1-6. This section in the appendix further describes the existing and the relocated plants basic design parameters and how the construction will take place.

**Treatment Technology Alternatives**

Alternative treatment technology considered include no discharge treatment technologies. Land application of treated wastewater works best with deep well drained soil, which is atypical of areas found in Madison County. Furthermore, it requires large areas of land, thereby substantially increasing the cost of disposal. Finally, public perception of land application could be a substantial obstacle to overcome. Thus, given these factors, and the availability of a receiving stream with secondary treatment level discharge limits, land application technologies were not considered favorable for these projects.

**Collection and Transportation Alternatives**

The three classifications of proposed projects will be analyzed for betterment by collection and transportation alternatives of the wastewater. Each of the classification's current conditions will

be described and reviewed. Drawing DWG 9-1 through DWG 9-8 shows the current configurations of the collection system and regional WWTP's for the NMCSD.

**Collection & Transportation of Type #1 Projects – Subdivisions**

Options considered for the Boone Village and Shady Hills sites include individual grinder pumps to push wastewater to a centralized pump station to convey the collected wastewater to the Regional WWTP or a gravity sewer collection system with a similar central pump station to the WWTP.

When reviewing the Boone Village project, the initial capital cost of each alternative is very similar, but the life of a residential grinder pump is generally 5-7 years and with an estimated replacement cost of approximately $2,500 for each replaced pumping unit. As you can see from just a total cost analysis, the gravity system is the logical best choice. Table 9-1 illustrates the project cost for this subdivision over the initial 20 years after installing Residential Grinder Units (RGU's) for each resident. The same central or main pump station and force main connection to the existing collection system would be required in either analysis to transport the wastewater into the existing collection system to the Regional Plant.

**Table 9-1 Generalized Residential Grinder Pump Collection System Costs**

| | Quantity | Estimated Unit Cost | Yearly Cost ($1,000's) 0-5 | 5-10 | 10-15 | 15-20 | Totals |
|---|---|---|---|---|---|---|---|
| Residential Grinder Unit | 70 | $5,000 | $350 | $0 | $0 | $0 | $350 |
| Replacement Pump Costs | 70 | $2,500 | $0 | $175 | $0 | $175 | $350 |
| 1.5" PVC Collection Line | 8,000 | $10 | $80 | $0 | $0 | $0 | $80 |
| 15 Hp Pump Station | 1 | $110,000 | $110 | $0 | $0 | $50 | $160 |
| 4" Force Main | 4,000 | $18 | $72 | $0 | $0 | $0 | $72 |
| **Est. Cost of Alternative** | | | $612 | $175 | $0 | $225 | $1,012 |

The low-pressure collection with the force main and pump station connection to the existing collection system alternative must consider the replacement cost of each of the grinder pumps every 5-7 years as well as the main pump station pumps after 20 years. The present value of this alternative calculated at 3% discount rate is $872,214. This assumes the $612,000 capital cost in year zero and the $175,000 RGU pump replacement costs in years 7 and 16 as well as the pump station pumps replacement in year 20. This alternative also assumes a $35,000 salvage value in year 21 for the pumps in the pump station.

The maintenance of the gravity system on the other hand requires very little cost after the initial installation of the lines and manholes. Therefore, the gravity sewer and centralized pump station option will almost always be selected if the topography allows for this option.

**Table 9-2 Generalized Gravity Sewer with Manholes Collection System Costs**

| | Quantity | Estimated Unit Cost | Yearly Cost ($1,000's) 0-5 | 5-10 | 10-15 | 15-20 | Totals |
|---|---|---|---|---|---|---|---|
| 8" PVC Collection Pipe | 8,000 | $35 | $280 | $0 | $0 | $0 | $280 |
| 4-foot Manholes | 35 | $4,500 | $158 | $0 | $0 | $0 | $158 |
| 15 Hp Pump Station | 1 | $110,000 | $110 | $0 | $0 | $50 | $160 |
| 4" Force Main | 4,000 | $18 | $72 | $0 | $0 | $0 | $72 |
| **Est. Cost of Alternative** | | | $620 | $0 | $0 | $50 | $670 |

The force main with gravity collection option will typically be the lowest cost alternative even considering the replacement cost of the pumps in the pump station after 20 years. The present value of this alternative calculated at 3% discount rate is $628,869. This assumes the $620,000 capital cost in year zero and the $50,000 pump replacement cost in year 20. This alternative also assumes a $35,000 salvage value in year 20 for the pumps in the pump station.

In some locations where the subdivision rolling terrain and the houses are constructed below the road grade with walk out basements, the only option for the collection of wastewaters is the residential grinder unit. Occasionally, to pick up a resident in a rural area, a grinder unit can be added into a nearby force main as it would be the only way to service that resident. This would be a decision not based on cost alone and the exception to the general analysis presented.

Evaluation of alternatives by present worth comparison is limited because the only items considered are construction costs, OM&R costs and salvage values. There are other factors not directly tied to these costs that should be considered in the selection of an alternative. These seven other factors which are used to evaluate the treatment alternative are identified and described below:

- Constructability – ease with which the alternative can be constructed and phased into operation.
- Energy Use – energy conservation.
- Environmental Impact – short-and long-term impacts on the environment.
- Flexibility – ability to adapt to changing conditions.
- Operability – ease of operation.
- Public Acceptance – a measure of the public acceptance of the project.
- Reliability – a measure of performance dependability.

A matrix was used to evaluate each alternative based on these factors. Each factor was given a subjective weight. A total of 100 points were distributed among the seven factors based on

relative importance. Each alternative was then assigned a ranking for each factor. A ranking of one represented the least favorable ranking, whereas a five represented the most favorable. Each alternative was then scored as the sum of weight factor times the assigned ranking. Totaling all the scores for each factor produced a final score for the two alternatives. Table 9–3 presents the matrix indicating non-economic effectiveness factors for the treatment alternatives.

**Table 9-3**
**Non-Economic Effectiveness Alternative Analysis**

Planning Area Opinion of Effectiveness
Wastewater Collection System

| Evaluation Criteria | Weighted Factor | Alternative A Gravity Sewer | | Alternative B Low Pressure Sewer | |
|---|---|---|---|---|---|
| | | Rank | Score | Rank | Score |
| Environmental Impact | 15 | 4 | 60 | 2 | 30 |
| Public Acceptance | 15 | 5 | 75 | 2 | 30 |
| Flexibility | 15 | 3 | 45 | 5 | 75 |
| Reliability | 15 | 4 | 60 | 2 | 30 |
| Operability | 15 | 5 | 75 | 4 | 60 |
| Energy Use | 10 | 5 | 50 | 3 | 30 |
| Constructability | 15 | 3 | 45 | 5 | 75 |
| Total Score | **100** | | **410** | | **330** |

Table 9-3 Demonstrates a non-economic view of the two alternatives considered for the Type #1 projects. The selected alternative is the one with the highest total score, which in this case is the Gravity Sewer option.

**Collection & Transportation of Type #2 Projects – Private WWTP's**

The only real option in most cases for the connection of the private WWTP's to the existing collection system will be cross country force main with a pump station to replace the private WWTP. Occasionally a gravity sewer may be considered, such as the case of the Waco Elementary School. Drawing DWG 3-6 for Project 3-10C shows the extension of services to the Waco Elementary School. This proposed project is setup for a pump station to replace the existing WWTP at the school and a small (3" estimated) diameter force main to transport the wastewater from the school to the existing gravity system connecting just east of the community of Waco.

The big advantage of considering gravity sewers would be to allow other residents along the route to connect to the sewer without utilization of Residential Grinder Units (RGU's) to pressurize the resident's wastewater into a force main. This option would also not require a pump station to replace the WWTP. Table 9-4 estimates the costs of this project utilizing gravity sewers with manholes to transport the wastewater to the existing sewer network.

**Table 9-4 Generalized Gravity Line Transportation System Costs**

| | Quantity | Estimated Unit Cost | Yearly Cost ($1,000's) | | | | Totals |
|---|---|---|---|---|---|---|---|
| | | | 0-5 | 5-10 | 10-15 | 15-20 | |
| 8" PVC Collection Pipe | 3,500 | $35 | $123 | $0 | $0 | $0 | $123 |
| 4-foot Manholes | 13 | $4,500 | $59 | $0 | $0 | $0 | $59 |
| **Est. Cost of Alternative** | | | $181 | $0 | $0 | $0 | $181 |

Since this alternative does not have any maintenance cost in the form of pumps to replace, the 20-year present value of this alternative is the total of the capital costs or $181,000. There would be no salvage value to the system at the end of the 20 years. The useful life of this type of structure should be 50 years or more, but it is rarely economical to dig up manholes or piping and reuse them after they have been installed.

The gravity sewer has some real advantages such as low to no maintenance, but the cost of gravity sewers with manholes over a long single line is greater than the single small diameter force main and a small pump station if the local residents are not interested in connecting to the system (see Table 9-5).

**Table 9-5 Generalized Force Main Line Transportation System Costs**

| | Quantity | Estimated Unit Cost | Yearly Cost ($1,000's) | | | | Totals |
|---|---|---|---|---|---|---|---|
| | | | 0-5 | 5-10 | 10-15 | 15-20 | |
| 5 Hp Pump Station | 1 | $70,000 | $70 | $0 | $0 | $25 | $95 |
| 3" Force Main | 3,500 | $18 | $63 | $0 | $0 | $0 | $63 |
| **Est. Cost of Alternative** | | | $133 | $0 | $0 | $25 | $158 |

The force main option will typically be the lowest cost alternative even considering the replacement cost of the pumps after 20 years. The present value of this alternative calculated at 3% discount rate is $138,778. This assumes the $133,000 capital cost in year zero and the $25,000 pump replacement cost in year 20. This alternative also assumes a $15,000 salvage value in year 20 for the pumps in the pump station.

If the residents (as in this case) are rural and have larger house lots with established septic tanks in good working order, they may elect not to immediately sign up for the service.

Table 9-6 looks at the costs associated with hooking up residents along the line with Residential Grinder Units and hooking into the force main.

**Table 9-6 Generalized Force Main w/ RGU Transportation System Costs**

| | Quantity | Estimated Unit Cost | Yearly Cost ($1,000's) | | | | Totals |
|---|---|---|---|---|---|---|---|
| | | | 0-5 | 5-10 | 10-15 | 15-20 | |
| Residential Grinder Unit | 9 | $5,000 | $45 | $0 | $0 | $0 | $45 |
| Replacement Pump Costs | 9 | $2,500 | $0 | $23 | $0 | $23 | $45 |
| 1.5" PVC Collection Line | 1,000 | $10 | $10 | $0 | $0 | $0 | $10 |
| 5 Hp Pump Station | 1 | $70,000 | $70 | $0 | $0 | $25 | $95 |
| 3" Force Main | 3,500 | $18 | $63 | $0 | $0 | $0 | $63 |
| **Est. Cost of Alternative** | | | $188 | $23 | $0 | $48 | $258 |

The force main with the RGU for each resident is the highest cost option. The present value of this alternative calculated at 3% discount rate is $226,811. This assumes the $188,000 capital cost in year zero and the $23,000 RGU pump replacement costs in year 7 and again in year 16 as well as the 25,000 pumps replace in the pump station in year 20. This alternative also assumes a $15,000 salvage value in year 20 for the pumps in the pump station.

As the three tables above show, the costs for gravity sewers for transporting wastewater cross country can look attractive to the option of hooking on additional users along the route when compared to the capital and maintenance cost of adding the users in by Residential Grinder Units. However, in most cases the pump station and force main option with or without any in line hookups along the force main will be the preferred option because of terrain issues.

**Collection & Transportation of Type #3 Projects – Plant Upgrades**

The WWTP's are all centralized facilities and setup to treat wastewater from a region of the planning area. Collection and transportation changes will not be discussed for this type of project.

**Other Alternatives**

Many of the owners will have to replace their current system with a Septic Tank with Effluent Pump (STEP) system. STEP systems are typically selected to handle the same conditions as those for a low-pressure sewer. They are in fact very similar in design with the exception that instead of pumping raw sewage, the simplex pump stations are placed downstream of a septic

tank. This substantially reduces both the solids concentration and organic strength of the sewage, making it easier to pump and treat. Given the NMCSD's lack of experience with STEP systems and the requirement for septic tank maintenance, this alternative was not given any further consideration.

Other alternatives could be a route pumping of the septic tanks at the most severely affected homes within the subdivision. This will require discipline by the homeowner and would not serve as a long-term solution. This alternative was not given any further consideration.

**Comparison of Alternatives for the Three Types of Projects**

A combination of gravity sewers flowing to a centralized collection point and then pumped to a regional wastewater treatment plant by small diameter force mains are the most cost efficient, lowest maintenance cost alternative and therefore the chosen method of wastewater collection for the Type #1 projects.

Depending on the topography and the potential to add additional customers along the collection route, a gravity wastewater transportation system may be selected for the type #2 projects. However, in the majority of cases considered, a force main with pump station will be the selected option because the terrain will prohibit a gravity sewer to work for the entire route.

After consideration of all the alternatives, centralization of wastewater processing is the recommended treatment process, therefore the expansion of the centralized WWTP's projects are presented to address the projected increase in population in the rural areas of the NMCSD planning areas.

**Present Worth Analysis of Year-0 to Year-2 Projects for each alternative**

The analysis of each alternative will address the projects proposed for the 0-2 Year Planning Period only. A material, labor and operational costs for work beyond that timeframe would involve so many unknowns that an analysis would not be correct and could potentially yield misleading results and therefore will not be presented.

**Alternatives for the Boone Village Sewer Project**

The No-Action alternative for this project as well as all projects will have no initial cost, but the opportunity lost to the NMCSD, the cost to each owner to replace, repair or abandon the dwelling because of non-compliance is very large. These factors and the non-monetary costs will be detailed below.

The opportunity lost would be in the form of 70 (69 residents and 1 commercial) customers at the monthly assumed average (4,000 gals/mo.) rate $61.49 or approximately $52,000 per year (see analysis in Section 11 of this report). A tap-on fee ($1,200 per customer + $750 per acre of lot development fee - minimum of $750 per lot) was assumed to be $1,950 per lot and for each user will generate an additional $136,500 one-time fee in the first year.

As stated before, STEP systems are an alternative to a steep slope and helps to distribute wastewater downstream of a septic tank. However, this type of system requires routine maintenance and pumping of the septic systems to prevent overloading the force mains and WWTP with septic solids. This would require the owner to purchase the pump and box configuration and have it installed. This cost is estimated as approximately $6,000 per installation. Electrical cost will be minimal for such a small pump package, but the maintenance cost can be large. Most systems will require pump replacement or major maintenance once every 5-8 years at an estimated cost of $2,500 each. If 10 homes (or 15% of the 70 residents) require this type of service, the total cost for the first installation would be $60,000 total with a 5-year maintenance cycle cost of $25,000 (per 5 years).

Table 9-7 below attempts to bring all these costs back to year zero to be able to compare alternatives. The inflation rate of 2% was used to discount the costs back to a present worth at year zero.

**Table 9-7 Cost Estimate of No-Action Alternative at Boone Village**

| Description | Cost | Timing of Cost | PV at 2% Inflation |
|---|---|---|---|
| Loss of Annual Revenue | $52,000 | Per Year | $850,000 |
| Loss of Initial Tap-on Fee | $84,000 | One Time | $136,500 |
| STEP Expense for 10 Homeowners | $60,000 | One Time | $60,000 |
| Maintenance on STEP system | $25,000 | Per 5 Years | $79,000 |
| **Total No-Action Opportunity Lost & On-Site Upgrade Expenses** | | | $1,124,500 |

**Optimization of Existing Facilities**

The only optimization of the existing facilities would be to replace the existing leach fields with better soils or to try the STEP method of treatment as summarized above. Therefore, the previous analysis is a good representation of the optimization option and the costs would be the same. All out of pocket money would be to the individual homeowners.

**Regionalization**

The detail cost for the installation and maintenance of the proposed Boone Village Sewer Project are listed below.

**Table 9-8 Detail Cost estimate of Boone Village Sewer Project**

| Description | Unit | Quantity | Unit Cost | Total Cost |
|---|---|---|---|---|
| 8" SDR35 PVC gravity sewer pipe | LF | 7,196 | $35 | $251,860 |
| 6" SDR35 PVC gravity sewer pipe | LF | 508 | 30 | 15,240 |
| 4' concrete manholes | EA | 35 | 3,000 | 105,000 |
| 4' concrete inside drop manholes | EA | 4 | 4,500 | 18,000 |
| Clean Out - End of Sanitary Sewer Line | EA | 5 | 1,400 | 7,000 |
| 4" SDR-21 PVC Force Main | LF | 4,100 | 17.50 | 71,750 |
| Combination ARV & Manhole Assembly | EA | 2 | 3,000 | 6,000 |
| Check Valve Assembly and Box | EA | 1 | 4,200 | 4,200 |
| Lost Fork Rd. PS | LS | 1 | 112,125 | 112,125 |
| Bore & Jack with 12.625" Steel Casing | LF | 236 | 235 | 55,460 |
| Bore & Jack with 8.625" Steel Casing | LF | 50 | 175 | 8,750 |
| Open Cut - Gas Line/Water - Gravity Sewers | LF | 200 | 13.50 | 2,700 |
| Open Cut - Gas Line/Water – Force Main | LF | 90 | 11.50 | 1,035 |
| Residential stub out | EA | 68 | 35 | 2,380 |
| Pavement Replacement | SF | 1,100 | 10 | 11,000 |
| Tie-in to Existing Force Main | EA | 1 | 2,500 | 2,500 |
| Total Estimated Opinion of Probable Construction Cost | | | | 675,000 |
| Total Estimated Opinion of Probable Project Cost | | | | 253,000 |
| **Total Estimated Opinion of Probable Construction & Project Cost** | | | | **928,000** |

The maintenance costs are estimated as:
Debt service..... $46,605
O&M (estimated)..... 12,000
Replacement Resv. ..... 1,825
KIA Admin. Fee..... 1,460
**Total Estimated Annual Cost ..... $61,890**

If the maintenance costs are discounted at 2% (present value is approximately $1,012,000) and added to the initial (year-0) construction and project costs, the total for this option becomes: 1,940,000, but this cost is offset with revenues from the clients (Annual Revenues for 20 years and the initial Tap-on Fee) of $986,500 as were shown as opportunity lost in the no-action alternative. The new total becomes: **$953,500** for this alternative.

## Decentralization

As stated previously in the decentralization discussion of the Type #1 Projects, this subdivision has always had on-site septic tank systems. The subdivision is completely built out with 1/3 to 4/10-acre size lots, with some on steeply sloping ground. Therefore, no additional space for individual lot drain field expansion is feasible. No decentralization option is available to this subdivision.

## Non-Monetary Analysis Boone Village Subdivision Project

Table 9-9 below attempts to score the effectiveness of the viable alternatives listed above. Each factor was given a subjective weight. A total of 100 points were distributed among the seven factors based on relative importance. Each alternative was then assigned a ranking for each factor. A ranking of one represented the least favorable ranking, whereas a five represented the most favorable. Each alternative was then scored as the sum of weight factor times the assigned ranking.

### Table 9-9 Non-Economic Effectiveness Alternative Analysis – Boone Village

Boone Village Sewer Project
Opinion of Most Effective Alternative

| Evaluation Criteria | Weighted Factor | Alternative A No-Action | | Alternative B Optimization | | Alternative C Regionalization | |
|---|---|---|---|---|---|---|---|
| | | Rank | Score | Rank | Score | Rank | Score |
| Environmental Impact | 15 | 1 | 15 | 1 | 15 | 4 | 60 |
| Public Acceptance | 15 | 2 | 30 | 2 | 30 | 5 | 75 |
| Flexibility | 15 | 1 | 15 | 1 | 15 | 3 | 45 |
| Reliability | 15 | 2 | 30 | 2 | 30 | 4 | 60 |
| Operability | 15 | 2 | 30 | 2 | 30 | 5 | 75 |
| Energy Use | 10 | 5 | 50 | 5 | 50 | 4 | 40 |
| Constructability | 15 | 3 | 45 | 3 | 45 | 4 | 60 |
| Total Score | **100** | | **215** | | **215** | | **415** |

## Recommend Alternative for Project #0-2A Boone Village Subdivision

Each of the alternatives were evaluated and conclusion drawn as to the best, most economical type of treatment and transportation of wastewater. Table 9-10 below detail these conclusions.

**Table 9-10 Comparison of Alternatives - Effectiveness Comparison Ratio**

| Project #0-2A Boone Village Subdivision | | | | |
|---|---|---|---|---|
| Alternate | | Present Worth (PW) | Non-Economic Effectiveness (NE) | Comparison Ratio (PW/NE)[1] |
| A | No-Action Alternative | $ 1,073,000 | 215 | 4,990 |
| B | Optimization of Existing Facility | $ 1,073,000 | 215 | 4,990 |
| **C** | **Regionalization** | **$ 953,500** | **415** | **2,298** |

[1]The lowest comparison ratio is bolded and represents the highest ranked/selected alternative.

While the present worth of each of the alternatives are almost a wash, Regionalization stands alone with a comparison ratio less than half of the other alternatives for the Boone Village Project. It is therefore the recommended alternative for this project.

**Alternatives for the Boone Trace WWTP to Battlefield WWTP Project**

The No-Action alternative for this WWTP expansion project will have no initial cost to the NMCSD, but the opportunity lost to the district, the cost to each owner to obtain large enough lots to perk effectively is considered large. These factors and the non-monetary costs will be detailed below.

This project expansion to the capacity of the Battlefield Estates WWTP from its current 114,000 gallons per day (GPD) by an estimated 100,000 GPD to approximately 214,000 GPD. This would allow for the new additional Twin Lakes subdivision lots (125) to be directed to this WWTP. As Table 2-1 shows, Battlefield WWTP currently has approximately 41,000 GPD of excess capacity. It was calculated that this new subdivision would add approximately 31,000 GPD to the plant and bring it dangerously close to its design capacity.

The No-Action alternative would see opportunity lost in the form of 125 new customers in the Twin Lakes subdivision addition that would have been paying customers at an estimated average monthly rate of $61.49 or approximately $92,000 per year. A tap-on fee for each user ($1,200 per customer + $750 per acre of lot development fee - minimum of $750 per lot) was

assumed at $1,950 per lot and will generate an additional $244,000 one-time fee in the first year.

Several alternatives for on-site wastewater treatment systems could be employed to treat household wastewater. The normal septic tank and leach field is the obvious solution if the soils, size of the lot and the slope of the lot will allow for this method of treatment. As have been discussed in several of the sections, the soils and slope of the lots in the county are an issue to this method of treatment. The author estimates this type of system would cost in the range of $5,000 to $8,000 per lot to install with a minimum amount of maintenance over the 20 to 30-year life of the system, if the system is installed properly and the site conditions are appropriate. Assuming 85% of the lots (or 106) could utilize this method of treatment with the average cost of $6,500 the total cost would be $689,000.

As discussed in the Boone Village section, STEP systems are an alternative to a steep slope and helps to distribute wastewater downstream of a septic tank. However, this type of system requires routine maintenance and pumping of the septic systems to prevent overloading the force mains and WWTP with septic solids. This would require the owner to purchase the pump and box configuration and have it installed. This cost is estimated at approximately $6,000 per installation. Electrical cost will be minimal for such a small pump package, but the maintenance cost can be large. Most systems will require pump replacement or major maintenance once every 5-8 years at an estimated cost of $2,500 each. If 19 homes (or 15% of the 125 residents) require this type of service, the total cost for the first installation would be $114,000 total with a 5-year maintenance cycle cost of $47,500.

Table 9-11 below attempts to bring all these costs back to year zero to be able to compare alternatives. The inflation rate of 2% was used to discount the costs back to a present worth at year zero.

**Table 9-11 Cost Estimate of No-Action Alternative at Battlefield WWTP**

| Description | Cost | Timing of Cost | PV at 2% Inflation |
|---|---|---|---|
| Loss of Annual Revenue | $92,000 | Per Year | $1,504,000 |
| Loss of Initial Tap-on Fee | $244,750 | One Time | $244,000 |
| Septic Tank & Field for 106 Homeowners | $689,000 | One Time | $689,000 |
| STEP Expense for 19 Homeowners | $114,000 | One Time | $114,000 |
| Maintenance on STEP system | $47,500 | Per 5 Years | $149,000 |
| **Total No-Action Opportunity Lost & On-Site Treatment Expenses** | | | $2,700,000 |

**Optimization of Existing Facilities**

The only optimization of the proposed new Twin Lakes subdivision would be to replace the existing soils in the leach fields with better soils assuming a source could be found, try the combination septic tank and STEP method of treatment as summarized above or make larger lots with less steeply sloping sites. Therefore, the previous analysis is a good representation of the optimization option and the costs would be similar. All out of pocket money would ultimately be to the individual homeowners in the purchase price of the lot or the construction of the home. This analysis is beyond the control of the district and will not be analyzed.

**Regionalization**

The detail cost for the installation and maintenance of the proposed upgrade to the Battlefield WWTP Project are listed below. This project will be financed and contracted by the NMCSD without loan assistance. The operator will most likely act as the general contractor for this project so that no additional addon administrative cost will be accumulated.

**Table 9-12 Detail Cost estimate of Boone Trace WWTP to Battlefield WWTP site**

| Description | Unit | Quantity | Unit Cost | Total Cost |
|---|---|---|---|---|
| Decommission & Excavation of Current Plant | LS | 1 | $10,000 | $10,000 |
| Move Plant to Rehab Site | LS | 1 | 18,000 | 18,000 |
| Sandblast, Paint and Recondition Plant | LS | 1 | 50,000 | 40,000 |
| Pour Concrete Foundation | SY | 200 | 200 | 40,000 |
| Move Plant & Install on Foundation | LS | 1 | 18,000 | 7,000 |
| Connect Electrical, Plumbing & Startup | LS | 1 | 4000 | 4,000 |
| Total Estimated Opinion of Probable Construction Cost | | | | 130,000 |
| Engineering and other Project Costs | | | | 20,000 |
| **Total Estimated Opinion of Probable Construction & Project Cost** | | | | **150,000** |

Additional annual maintenance costs for the entire plant will increase over current numbers. The new estimated yearly costs are detailed below:

Debt service..... $0 (note: addition paid for from cash reserves)
O&M (average year)..... 95,000
**Total Estimated Annual Cost ..... $95,000**

The gravity sewer for the new Twin Lakes subdivision will not be constructed by NMCSD, but it will be in the cost of the lots/homes. It is expected that the district will end up owning and operating the pump stations that tie back to the existing gravity sewers in the area. These costs must be considered if the analysis with the No-Action alternative is comparable.

**Table 9-13 Estimated Sewer Costs of New Twin Lakes Subdivision**

| Description | Unit | Quantity | Unit Cost | Total Cost |
|---|---|---|---|---|
| 8" SDR35 PVC gravity sewer pipe | LF | 20,000 | $35 | $700,000 |
| 4' concrete manholes | EA | 80 | 3,000 | 240,000 |
| 4" SDR-21 PVC Force Main | LF | 5,000 | 17.50 | 87,500 |
| Combination ARV & Manhole Assembly | EA | 1 | 3,000 | 3,000 |
| Check Valve Assembly and Box | EA | 1 | 4,200 | 4,200 |
| 5 Hp Pump Stations | LS | 2 | 70,000 | 140,000 |
| Residential stub out | EA | 125 | 35 | 4,375 |
| Tie-in to Existing Force Main | EA | 1 | 2,500 | 2,500 |
| Total Estimated Opinion of Probable Construction Cost | | | | 1,182,000 |
| Total Estimated Opinion of Probable Project Cost | | | | 414,000 |
| **Total Estimated Opinion of Probable Construction & Project Cost** | | | | **1,596,000** |

The yearly maintenance costs are estimated as:
Debt service..... $0 (Facilities donated to district by Developer)
O&M (estimated)..... 15,000
**Total Estimated Annual Cost ..... $15,000**

If the maintenance costs for both the new operating WWTP ($95,000 per year for 20 years discounted at 2% = $1,553,000) and the new Twin Lakes subdivision (15,000 at 2% for 20 years = $245,000) are added to the initial (year-0) sewer construction and project costs for the WWTP upgrade ($150,000) and the new Twin Lakes subdivision ($1,596,000), the total year-0 cost for this option becomes: $3,544,000, but this cost is offset with revenues from the clients (total annual revenues + tap-on fee = $1,748,000) as were shown as opportunity lost in the no-action alternative. The new total becomes: **$1,796,000** for this alternative.

**Decentralization**

No decentralization option is available to this plant upgrade project with the new subdivision addition.

**Non-Monetary Analysis Battlefield WWTP Upgrade Project**

Table 9-14 below attempts to score the effectiveness of the viable alternatives listed above. Just like the non-monetary analysis performed on the Boone Village project, each factor was given a subjective weight. A total of 100 points were distributed among the seven factors based

on relative importance. Each alternative was then assigned a ranking for each factor. A ranking of one represented the least favorable ranking, whereas a five represented the most favorable. Each alternative was then scored as the sum of weight factor times the assigned ranking.

### Table 9-14 Non-Economic Effectiveness Alternative Analysis – Battlefield WWTP

Battlefield WWTP Capacity Increase Project
Opinion of Most Effective Alternative

| Evaluation Criteria | Weighted Factor | Alternative A No-Action | | Alternative B Regionalization | |
|---|---|---|---|---|---|
| | | Rank | Score | Rank | Score |
| Environmental Impact | 15 | 3 | 45 | 4 | 60 |
| Public Acceptance | 15 | 3 | 45 | 5 | 75 |
| Flexibility | 15 | 1 | 15 | 3 | 45 |
| Reliability | 15 | 3 | 45 | 4 | 60 |
| Operability | 15 | 3 | 45 | 5 | 75 |
| Energy Use | 10 | 5 | 50 | 2 | 20 |
| Constructability | 15 | 5 | 75 | 5 | 75 |
| Total Score | **100** | | **320** | | **410** |

**Recommend Alternative for Project #0-2B Boone Trace WWTP to Battlefield WWTP site**
Each of the alternatives were evaluated and conclusion drawn as to the best, most economical type of treatment and transportation of wastewater. Table 9-15 below detail these conclusions.

### Table 9-15 Comparison of Alternatives - Effectiveness Comparison Ratio

| Project #0-2B Boone Trace WWTP to Battlefield WWTP site | | | | |
|---|---|---|---|---|
| Alternate | | Present Worth (PW) | Non-Economic Effectiveness (NE) | Comparison Ratio (PW/NE)[1] |
| A | No-Action Alternative | $ 2,606,000 | 320 | 8,143 |
| **B** | **Regionalization** | **$ 1,796,000** | **410** | **4,380** |

[1]The lowest comparison ratio is bolded and represents the highest ranked/selected alternative.

While the present worth of the Regionalization option is considerably the larger of the two alternatives, after applying the non-economic effectiveness score, Regionalization becomes more attractive of the two options with a comparison ratio less than the No-Action alternative for the Battlefield WWTP Project.  It is therefore the recommended alternative for this project.

## Section 10 - Crosscutter Correspondence and Mitigation

Letters were sent to the agencies listed below to determine if the proposed projects would create adverse impacts to social, historical, or environmental resources. Copies of the letters sent to these agencies and the responses from the agencies are attached in the following sections of the appendix to this report.

Section 10-1 U.S. Fish and Wildlife Service Correspondence

Section 10-2 Kentucky Department of Fish and Wildlife Resources Correspondence

Section 10-3 Kentucky Heritage Council Correspondence

Section 10-4 U.S. Army Corps of Engineers Correspondence

Section 10-5 Natural Resources and Conservation Service Correspondence

Section 10-6 Letters and responses from Project #0-2A - Boone Village Subdivision

A regional review by each agency was performed for all the projects and their responses are included.

The "Project #0-2A – Boone Village Subdivision" is very close to construction and was evaluated separately from this report. The 30-day public comment period for the environmental review (FONSI) is completed for this project and the KY DOW is expected to give authorization to advertise for construction bids by the end of Sept. 2020. The correspondence from the Boone Village project was added to this Section 10-6 of the appendix for completeness.

To summarize, the response from the U.S. Fish and Wildlife Service was that significant impacts to federally listed species was not likely.

The Kentucky Heritage Council responded with a letter that indicated that these types of projects have the potential to affect historic properties. As the projects develop, the agency recommend that the owner gather information on any identified cultural resources in the area and submit a preliminary records request to the data managers at the Kentucky Heritage Council.

The U.S. Army Corps of Engineers indicated that the proposed work for at least one of the projects had the potential to be in the "waters of the U.S." They warned that if the project would

be discharging dredged or fill material into any “waters of the U.S.”, then the owner would need to submit a DA permit application.

The Natural Resources and Conservation Service stated that no conversion of agricultural lands (Prime or Statewide Important Farmland) will occur or be negatively impacted by the proposed year-0 through year-2 projects.

Additionally, all these agencies were contacted for the proposed Project #0-2A Boone Village Subdivision. All environmental reviews have been completed on this project and the owner is looking to advertise this project for construction bidding very soon.

Jim Rowe, Chairman of the NMCSD, has signed a statement that the District will commit to all environmental mitigation required by the federal cross-cutter agencies. This statement may be found in Appendix Section 10-7 of this document.

# Section 11 - Evaluation of Recommended Regional Facilities Plan

## Environmental Impacts

### Water Quality

As a consequence of eliminating failing on-site septic systems, the net effect of these projects will be a regional quality improvement in both the surface water and groundwater.

### Wetlands and Floodplains

No wetland disturbance is anticipated by these projects.

### Air Quality

No impact on air quality, neither positive nor negative, is anticipated by these projects. During construction, the contractor will operate his construction equipment in compliance with existing air quality requirements.

### Endangered Species

The United State Fish and Wildlife Service (USFWS) and the Kentucky Department of Fish and Wildlife Resources (KDFWR) were contacted to determine if there were any federally or state listed threatened or endangered species in the vicinity of the project sites. KDFWR personnel indicated that due to the nature of the project, impacts to listed species or any critical habitat, wetlands, special aquatic sites, or refuge areas are not anticipated. USFWS personnel indicated that two federally listed species have the potential to occur within the project vicinity, which are the Indiana bat and running buffalo clover. In addition, the proposed construction in the 0-2-year planning period is located in the backyards of a residential area and at an existing treatment plant site. Each individual proposed project will have to complete a more specific and greater detailed environmental review before funding will be released and authority to bid is granted. Boone Village's environmental clearance letters are shown in the Appendix to this report. Therefore, no impact on endangered species is anticipated by these projects.

### Historical and Archaeological Resources

The Kentucky Heritage Council was contacted regarding the possibility of historic and archaeological resources on or adjacent to the proposed project site. A letter was received from

Mr. Craig A. Potts, the State Historic Preservation Officer (SHPO). Mr. Potts indicated that as projects are developed, and more specifics are known, that he would be glad to review the projects at that time. An archaeological survey and an above ground survey were completed for the Boone Village Project (#0-2A). This project has completed the 30-day comment period for the Finding of no Significant Impact (FONSI). Cultural Resources completed an on-site archeological investigation of the one pump station site on this project. There were no significant items discovered at that site. Therefore, no impact on historical or archaeological resources is anticipated by this project. A copy of the conclusions from the archaeological survey report is provided in the Appendix.

**Other Environmentally Sensitive Areas**

No impacts on prime farmland or other environmentally sensitive areas are anticipated by this project.

**Institutional Structure**

The Northern Madison County Sanitation District will construct, own and operate the proposed facilities, all within their existing Planning Area, or within newly established Planning Area that is currently undesignated. Therefore, no inter-municipal agreements will be required. Furthermore, the improvements addressed in this Plan will not require any special site-specific rules or Sewer Use Ordinance changes.

**Funding Plan**

The Funding Plan discussed herein addresses the initial projects proposed for the 0-2 Year Planning Period only. A funding plan for work beyond that timeframe would involve so many unknown variables (such as future rates, future construction costs, future customer base, interest rates, grant availability, etc.) that a funding analysis would not yield useful results at this time.

A. Proposed 0-2-year Planning Period Project Funding

Boone Village Sewer Project (#0-2A) and Project (0-2B) Move Boone's Trace WWTP to the Battlefield WWTP site are anticipated to be completed within two years. Future sewer projects will be constructed each year to extend sewers into the outlying region if and as funds become available.

B. Project Cost – Boone Village Sewer Project (#0-2A)

Project #02-A capital costs are summarized in Table 11-1 below.

**Table 11-1**
**Boone Village Sewer Project (#02-A) Capital Costs**

| | |
|---|---|
| Construction Cost | $ 675,000 |
| Legal, Land and Right of Way | 5,000 |
| Administrative | 20,000 |
| Engineering (Design and Resident Observation) | 118,000 |
| Project Contingencies | 67,500 |
| Bring 3 phase power to the pump station | 42,500 |
| Total Project Cost (rounded to nearest $10,000) | $ 928,000 |

C. Projected Operational Cost – Project 0-2A Boone Village Sewer Project

The projected or estimated operational costs are summarized in Table 11-2 below. Costs are for operations and maintenance only. There is no outstanding debt service on this proposed collection system.

**Table 11-2**
**Boone Village Sewer Project (#02-A) Operational Costs**

| Boone Village Sewer System | | | | | |
|---|---|---|---|---|---|
| | Quantity | Units | Unit Cost | | Annual Total |
| Payroll (1 hrs/day x 5days/wk x 52wks/yr) | 260 | hours | $ 30 | per hour | $ 7,800 |
| Fuel (4mis/wk x 52 wks/yr) | 208 | Gallons | 4.00 | per gal | 832 |
| Electrical ((250gpd x 70)/107gpm) x 365 d/yr | 59,696 | kw-hrs/yr | 0.11225 | per kw-hr | 6,701 |
| Preventive Maint: belts, filters, oil,& grease | 1 | lump sum | 2,000 | per year | 2,000 |
| Major Maintenance | 1 | lump sum | 2,320 | per year | 2,320 |
| Total Operating Expenses | | | | | $ 19,653 |

Electrical cost is based on estimated energy demands of pumps to meet the design flow and the current power costs.
Annual major maintenance cost is assumed 0.25% of construction cost.

This total value of Operational Costs seems extremely conservative as the District estimates the Total Annual Operational Costs for this system to be more in the range of $11,000/year - $12,000/yr., based on the actual costs of other similar operating stations within their system.

**Replacement Costs**

The Kentucky Infrastructure Authority (KIA), who has already committed funds for this project (Loan # A20-049, &730,000. For 20 yrs. at 2.50%) has a requirement of 5% of the gross loan amount be set aside for replacement reserve plus a 0.2% of the outstanding loan balance administrative fee to be paid for a Fund A (Wastewater) Loan. Therefore 5% of the KIA Loan amount of $730,000 would be $36,500. Divide this by 20 yrs. and that produces $1,825/ yr. required. The administrative fee equals $1,460/yr., which will decline each year as the outstanding balance declines.

Therefore, the total cost will be;

| | |
|---|---|
| Debt service | $46,605 |
| O&M (estimated) | 12,000 |
| Replacement Resv. | 1,825 |
| KIA Admin. Fee | 1,460 |
| Total Estimated Annual Cost = | $61,890 |

**Income – Project 0-2A Boone Village Sewer**

The KIA did an extensive analysis of the Boone Village Sewer Project and the financial condition of the District, before agreeing to offer them a loan. This comprehensive analysis is included in the Appendix for your reference.

If we assume an average usage in this subdivision of 4,000 gallons per month, the cost per household would be $61.49/ month. With 70 (69 residential and1 commercial) customers that would generate $51,652. Monthly revenue based on the rate schedule in effect 1/1/2020, a copy of which is also included in the Appendix.

The rate schedule/ordinance has an automatic adjustment based on the Consumer Price Index (CPI). The CPI on the 1/1/2020 rate schedule is 2.3%. NMCSD has the highest rates of the 15 wastewater providers in the Bluegrass Area Development District Area for the minimum bill 2,000 gallons, 3,000 gallons and 4,000 gallons. For 6,000 gallons, they rank 13th and for 30,000 gallons they have the lowest rate out of all 15 providers. One reason their rates are high is that until the Muddy Creek WWTP was built, they were sending the Green's Crossing Area flow to the City of Richmond for treatment. Richmond's rate for treating the Districts flow was quite high which in turn drove NMCSD's rates up. The reason the 30,000 gallons/month rate is the lowest is the District caps the rate with a $77.50 maximum bill.

The District also has a $1,200 Tap-on fee and a $750/acre minimum development fee for each hook on to the new sewer system. Most of the lots in Boone Village range from 1/3 to 4/10 of an acre with a few in the lower portion of the subdivision which are approx. ¾ of an acre. These smaller lots still will be charged a $750 minimum development fee to hook up to the new system. Or another way of looking at it would be the cost to connect to the new sewer including the tap-on fee and the development fee would be $1,950 per lot.

If a resident connects to the new sewer within 90 days of being informed it is ready to receive connections, the District will waive the development fee and the new customer will only have to pay the tap-on fee. Therefore, that amount of revenue will be 70 x $1,950 or $136,500. Some of this additional money will offset the deficit of the proposed expenses and some will be contributed to the project as local funds to the Capital Costs of the project.

**Funding Plan for Project 0-2B Boones Trace WWTP to Battlefield WWTP site**

The funds for this rehabilitation and reinstall the Boone's Trace steel WWTP to the Battlefield WWTP site will be funded by the District. The source of these funds will be tap-on fees and the District's General Fund (GF). Assuming 125 (Twin Lakes new connections) tap-on fees at $1,950 = approximately $244,000, which is more than enough to cover the cost of the relocation and reinstallation. Naturally all of this money will not come at the beginning of the project so the District may have to supplement the cost from their GF. In addition to these funds monthly user fees could also be used to offset this cost. Assuming a monthly bill of $61.49 (average 4,000 gallons per monthly usage) times 50% of the Twin Lakes new connections would produce $46,500. It is assumed that the cost of this relocation would be $150,000, which could be easily funded as indicated above in a little more than 3 years. If the District has to dip into the GF to do the project, those funds could soon be replenished.

There will not have to be a rate increase to make these improvements. It will be funded from an increased customer base.

**Funding Scenario**

The KIA has already approved the funding package as mentioned previously. Refer to their financial analysis in the Appendix.

**Economic and/or Social Impact**

The Appendix Section 1-1 contains a copy of the most recent rate structure established by the NMCSD. This rate schedule references the Consumer Price Index (CPI) for the basis of the increase. Resolution 11-10 located in Appendix Section 11-3 details the Jan 1, 2011 rates and also annual adjustment of those rates based on the CPI. These rates will be effective regardless of whether or not the projects discussed in this plan are implemented.

**Implementation Schedule**

Table 11-8 is a proposed implementation schedule for the projects outlined in this report. Given the environmental urgency to complete Project 0-2A and the ability of the District to self-fund Project 0-2B, Boone Village Sewer Project is ready to bid as soon as the environmental clearance (FONSI) is completed (approved 9/11/2020) and Relocation of the Boone's Trace WWTP to the Battlefield site will be implemented shortly after approval of this Facilities Plan.

The ensuing projects/phases of work are generally separated into moderately sized projects that can be more easily funded and quickly implemented due to their size. The order which these projects are presented could change based on demand or the ability to obtain funding for a

particular project over others shown. Sometimes funding opportunities come along that would jump one project over one listed above it in this table.

**Table 11-3**
**Proposed Implementation Schedule**

| Project # | Description | Completion Date | |
|---|---|---|---|
| | | Design | Construction |
| **0-2 Years** | | | |
| 0-2A | Boone Village Subdivision | May, 2020 | October, 2020 |
| 0-2B | Relocate Boone's Trace WWTP to Battlefield Site | June, 2020 | January 2021 |
| **3-10 Years** | | | |
| 3-10A | Rehab Madison Village Sewer System | September, 2017 | June 2023 |
| 3-10B | Connect Moberly Shell, Decommission their WWTPs | July, 2024 | October 2024 |
| 3-10C | Extend Sewer to Waco Elem. Decomit their WWTP | June, 2025 | August 2025 |
| 3-10D | Extend Sewer to Shady Hills Subdivision | Jan, 2026 | December 2026 |
| 3-10E | WWTP and Collection System west of I-75 | December 2026 | April 2027 |
| **11-20 Years** | | | |
| 11-20A | Extend Sewer to Bybee Quick Stop decom. WWTP | July, 2031 | December 2031 |
| 11-20B | Extend Sewer to Kingston Elem. Sch. Decom. WWTP | January, 2032 | July 2032 |
| 11-20C | Ex. Park Capacity Increase Study or pump to Battlefield | January, 2039 | December 2039 |
| 11-20D | Battlefield WWTP Design Capacity Increase Study | December 2039 | ----- |
| 11-20E | Regional WWTP Design Capacity Study | January, 2039 | ----- |
| 11-20F | Ex. 97 Extend Sewer to Simpson Lane | June, 2039 | December 2039 |

## Section 12 – Documentation of Public Participation

1. Newspaper Advertisement

   - Copy of Public Notice
   - Affidavit of Publication

2. Measures Taken to Solicit Public Participation

   - Publish Public Meeting Notice in Local Newspaper

3. Summary Report Presented at Public Meeting

   - Presentation Document, handouts and large format exhibits presented.

4. Public Meeting Attendance Sheet

5. Minutes of the Public Meeting and Comments

   - Minutes from the Public Meeting
   - Public Comments

## Public Notice

NOTICE OF PUBLIC MEETING

The Northern Madison County Sanitation District (NMCSD), 201 Aqueduct Dr., Suite B-11, Richmond, KY 40475 has drafted a Regional Facilities Plan (RFP) containing projected wastewater requirements for collection and treatment and its cost, within the planning area, as described therein. Interested citizens may obtain further information and view a copy of the draft RFP by contacting the NMCSD at the address above or by calling the NMCSD manager, Elliott Turner at (859) 626-0431, between the hours of 8 a.m. and 4 p.m. on Monday to Friday.

A public meeting will be held on-line on 09/24/2020 at 3:00 PM via video-teleconference. To participate go to Nesbitt Engineering, Inc. Public Meetings page at https://www.facebook.com/106302131222745/live/ The purpose of the public meeting is to discuss the draft plan and its contents, specifically the alternatives, project costs, financing sources, user charges and hook up/tap on fees. The public is encouraged to attend this meeting and shall have the right to comment on the plan for a period of 30 days from the date of publication of this notice by writing to the above address or before the termination of the hearing whichever is later. A longer comment period may be requested in writing. All persons who believe any condition of the draft plan is inappropriate, inaccurate, incomplete or otherwise not in the best interest of the public and environment must raise all reasonable issues and submit all reasonable arguments, facts and comments with supporting documents to Bill McGregor at Nesbitt Engineering, Inc., 227 No. Upper St., Lex., KY 40507 or bmcgregor@nei-ky.com.

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Note:

1. This notice must be published in a local newspaper of largest circulation not less than 7 days before and not more than 21 days before the scheduled public meeting date.
2. An affidavit of publication, tear sheet, with the roster, minutes (including day, date, time, and place) of the meeting and transcript with comments of the participants shall be submitted with the draft RFP in accordance with 401 KAR 5:006, Section 4 (8).
3. The hearing shall be held at a place and time which, to the maximum extent feasible, facilitate attendance by the public, including consideration of transportation and use of evening and weekend hearing.

# RICHMOND REGISTER

## Madison County Advertiser

I, Pamela Bowlin (name), classified / legal ad rep (title) of the Richmond Register and the Madison County Advertiser hereby state that the advertisement concerning NMCSD Public Meeting did run in the Richmond Register on the requested date(s), Thursday, September 17, 2020 (dates).

Pamela B
Signature

9/28/2020
Date

Notary Public Signature

Jan 2021
Expiration Date

380 Big Hill Avenue • Richmond, KY 40475
859-623-1669 • fax 859-623-2337

# Richmond Register Classifieds

859-624-6691 or 859-624-6681

www.richmondregister.com

## 147 Legals

**Patrick and Cheryl Dennis** of **Sexy's LLC**, mailing address **3317 Old KY Hwy 52, Richmond, KY.** Hereby declares intention(s) to apply for a NQ retail malt beverage package; NQ4 retail malt beverage drink and Quota retail drink license(s) no later than **September 17, 2020**. The business to be licensed will be located at **103 Big Hill Ave., Richmond Kentucky 40475** doing business as **Sexy's**. The (owner(s) are as follows: Owner, **Cheryl Dennis** of 3317 Old KY Hwy 52, Richmond, Ky 40475; Owner, **Patrick Dennis**, of 3317 Old KY Hwy 52, Richmond, KY 40475. Any person, association, corporation, or body politic may protest the granting of the license(s) by writing the Dept. of Alcoholic Beverage Control, 500 Mero Street, 2NE33, Frankfort, KY 40601 within 30 days (KRS 243.430) of this legal publication.

## 165 Public Notices

**Notice of Sale**

NOTICE IS HEREBY GIVEN that the undersigned intends to sell the personal property described below to enforce a lien imposed on said property under the Kentucky Self Storage Facility Act Statues (Section 359.200-359.250). The undersigned will sell at public sale by competitive bidding on **Thursday, September 24, 2020 at 10:00 am EST on Lockerfox.com**. Said property is stored at: **Storage Rentals of America, 221 Pauline Drive, Berea, KY 40403 Madison Kentucky The following: Larry Hackley Unit:0307 Household Items Larry Hackley Unit: 0265 household items Larry Hackley Unit: 360 Household items Larry Hackley Unit: 0361 Household items Shawn King Unit: 0327 Household Items** Purchases must be paid for at the time of purchase by cash only. All purchased items are sold as is, where is, and must be removed at the time of the sale. Sale is subject to cancellation in the event of settlement between owner and obligated party. Dated this September 14, 2020

## 230 Job Wanted

**JOB WANTED Will take care of elderly in their home. Housekeeping, caregiver, have car to run errands Experienced w/ref. Call for info. 502-331-7959**

## 305 Agriculture

NEED barn taken down and removed. 60 1/2 ft .long x 36 ft wide. Quite tall NO CHARGE for take down.Reasonable cleanup 606-726-0508

## 330 Books & Literature

WORLD BIBLE SCHOOL Free Bible Studies Send request to: BIBLE STUDY P.O. Box 44 Science Hill, KY 42553 Call or text: 1-931-227-6764 also; Email to: dgmcmullin4@gmail.com Leave name and address with zip code

## 370 Firearms

Ammunition Winchester 30-06 Ballistic Silvertip $25 OBO 859-408-8434

## 390 Furniture

Oak China Cabinet Like new, $75; Maple Hutch, exec. cond. $75 and Oak Oval Coffee Table, Like new $75 859-527-3416

## 390 Garage Sale

GARAGE SALE

**140 Carlton Dr. Wellington Subd. Fri & Sat. 8am-?** Baby Items, maternity, baby & adult clothes, toys, children's books, households items, & more RAIN OR SHINE

In the mood for a remodel? Find a building professional in "Call an Expert".

## 390 Garage Sale

**2 FAMILY YARD SALE Sat. Sept 19/ 8:30-3 Sun Sept. 20/ 8:30-noon 2033 Jacks Creek Rd.** 7 min. from White Hall School **To view items in yard sale visit Facebook (Madison Yard Sale in KY)after 5pm on Friday.** Lifejackets, cooler, furniture, antique cabinets, clothes and more

Garage SALE!

**277 Meridian Way off Barnes Mill Rd. across from Meijers Friday Sept 18 & Saturday Sept. 19 8am-2pm huge yard sale downsizing everything** antiques, pictures, snowblower, tools, household items, plus a generator and more.

YARD SALE

**115 Highland View Sat. Sept. 19th 8:00-4:00** double xx case knives, part washer, wilson vice, tools, tool box, bunch of shovels, tonka trucks, tires & wheels, pokemon cards,green machine, snowblower, new dual burner, brand new 1/2 inch drill and more!

## 450 Misc Items Wanted

**Want to buy older motorcycles and parts. Also WWI & WWII Items. #606-571-3772**

Buying or selling a motorcycle? Advertise your motorcycle or search for one right here in the Richmond Register Classifieds!

## 510 Homes

PUBLISHER'S NOTICE

EQUAL HOUSING OPPORTUNITY

ALL REAL ESTATE ADVERTISING IN THIS NEWSPAPER IS Subject to the Fair Housing Act which makes it illegal to advertise "any preference, limitation or discrimination, based on Race, color, religion, sex, handicap, familiar status or national origin, or an intention, to make any such preference, limitation or discrimination." Familiar status includes children under the age of 18 living with parents of legal custodians, pregnant women and people securing custody of children under 18. This newspaper will not knowingly accept an advertisement for real estate which is in violation of the law. Our readers are hereby informed that all dwelling advertised in this newspaper are available on an equal opportunity basis.

f

## 515 Mobile Homes

**1991 Apollo Mobile Home. Gray 16' x 60'. MUST MOVE $6500 859-353-5156 or 859-661-8024**

## 610 Homes

**In country, 3bd, 2/fba,1-car gar. Brick ranch on acre lot. $800mo + dep+lease . 859-527-3215**

## 630 Apartments

**Morrow Rentals**

Shade Tree Apartments 623-9156, 582-3304, 582-9104 1 & 2 bedroom Apartments range refrigerator, No pets $475 + deposit

HAGER RENTAL 623-8482 1, 2, & 3 bedrooms some w/garages some furnished Houses for rent also

## 630 Apartments

Newly Renovated Units Available

FOXGLOVE APARTMENTS

**QUIET NEIGHBORHOODS CONVENIENT LOCATIONS**

1/2/3 Bedrooms Electric & water w/cap SOME PET FRIENDLY

624-3545

**1 Br as low as 425/mnth, 2 brs as Low as $525/mnth** visit us at 408 Jason Dr. Ste 101 or sales@foxapts.com Commercial Properties Available

East Ridge APARTMENTS

**Now Leasing** 1 & 2 bdrms Come visit us at **410 Jason Dr., B11** across from Gibson Bay Golf Course **CALL 859-353-8002** No Pets, No Section 8

**NEED WHEELS? WANT TO TRADE?** The Classifieds bring together cars, SUVs, and trucks with drivers every day.

The Richmond Register 624-6681

Selling your cycle? Richmond Register Classified is the most effective way to reach readers who are ready to ride!

The classifieds are the most effective way to advertise to thousands of readers who are in the market for a pet. When you need information - it's Classified.

Classifieds get RESULTS! Call 624-6681

## 635 Commercial & Business

**COMMERCIAL RENTALS**

**NOW AVAILABLE!**

813 & 815 Heath St, Richmond, KY 40475 ***Large commercial spaces with office areas ample parking and more!*** Call/Text: 859-200-0644

BETH RICE kw LEGACY GROUP KELLERWILLIAMS REALTY

## 645 Mobile Homes

**Stone Creek Community** Restructured, 1, 2, & 3 Bdrm Mobile Homes. Utls. pd. Will work w/dep. Security Patrolled. **625-5757**

## 730 Autos

**FOR SALE**

1987 Nissan 300zx sportscar Red, owned for 21 yrs. Excellent Condition

$14,000 859-338-0475

SELLING A **HOUSE**? BUYING A **HOUSE**? The Classifieds bring together homeowners and house hunters every day.

The Richmond Register **CLASSIFIEDS** Featuring new listings every day! 624-6681

**Dr. Rajan Joshi and Dr.Shobhna Joshi office is closed**

**THE NEW CONTACT PHONE NUMBER for patients and Medical personnel is**

**859-397-1053**

Cash in on the Classifieds. In print, online, anytime. Call 624-6681 Richmond Register and richmondregister.com


The life cycle of a Classified ad: Here today, gone tomorrow!

Job to fill? Hire here. Reach the best and the brightest with an ad in the Richmond Register print classifieds and online @ richmondregister.com Call 624-6681

We caught you reading a classified ad! Find out what thousands of savvy sellers already know – Classified Advertising Works! Call 624-6681 to place your ad.

Buy It. Sell It. Find It. Classified!

Looking for a new career? Richmond Register Classified and richmondregister.com is the first place you should look to find great jobs with reputable companies.

Wanting to advertise a new job opening at your company? Richmond Register Classified and richmondregister.com is the best place to list your job openings.

If this were your ad, a potential buyer would be looking at it right now. Call 624-6681 to place your ad here.

One call gets your ad in the Richmond Register and online at richmondregister.com. Call Classified at 624-6681.

Whether you sell your stuff isn't a matter of luck – it's a matter of advertising. Get the word out! In print, online, anytime. Call 624-6681 to place your ad.

Need help with your computer? Find a computer professional in the "Call an Expert".

Little ads produce BIG results! Cash in on Classified

Best local Classified – in print and online. Richmond Register and richmondregister.com

Trees need trimming? Find a lawn and garden professional in "Call an Expert".

**Did You Hear The News? Everyone's Logging On To Madison County's #1 website www.richmondregister.com**

Put your stuff where more people will see it...in Classified! Call 624-6681 In print, online, anytime. Richmond Register and richmondregister.com

Here today...Gone tomorrow! When you let Richmond Register Classifieds do the work, you won't get the runaround. Advertising in the Classifieds is easy, effective and will get you results. Call 624-6681 today. In print, online, anytime.

Classifieds simplify your life! Get rid of your unneeded items – hold a Garage Sale. Call 624-6681 to place your ad.

Sell it all... make the call. Richmond Register Classifieds - in print, online, anytime. Call 624-6681 to place an ad.

Classifieds simplify your life! Get rid of your unneeded items – hold a Garage Sale. Call 624-6681 to place your ad.

**Want To Sell Your House?**

**Want To Sell Your Car?**

Place A Classified Ad 624-6681

## NOTICE OF PUBLIC MEETING

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A public meeting will be held on-line on **09/24/2020 at 3:00 PM** via video-teleconference. To participate go to **Nesbitt Engineering, Inc. Public Meetings page at https://www.facebook.com/106302131222745/live/** The purpose of the public meeting is to discuss the draft plan and its contents, specifically the alternatives, project costs, financing sources, user charges and hook up/tap on fees. The public is encouraged to attend this meeting and shall have the right to comment on the plan for a period of 30 days from the date of publication of this notice by writing to the above address or before the termination of the hearing whichever is later. A longer comment period may be requested in writing. All persons who believe any condition of the draft plan is inappropriate, inaccurate, incomplete or otherwise not in the best interest of the public and environment must raise all reasonable issues and submit all reasonable arguments, facts and comments with supporting documents to

**Bill McGregor**
**Nesbitt Engineering, Inc.,**
**227 No. Upper St., Lex., KY 40507**
**or email:bmcgregor@nei-ky.com .**

## PUBLIC NOTICE

The City of Richmond Planning and Zoning Commission will hold a **Public Hearing on Thursday, September 24th, 2020 at 5:30 p.m. at the City Hall in Richmond, Kentucky** to consider the Request of the Annexation of 40.51 +/- acres on Concord Road, Richmond, Kentucky by current owners, Curtis R. Tate and Barbara Tate, Darrell E. Tate and Rhonda Tate, and Patrick Tate and Peggy Tate, and Buyer, Allen D. Grant for property to be annexed into the City Zoned as R-2 and also to consider the Request of the Re-Zoning as R-2 of 16.13 +/- acres on Anna Hume Blvd., Richmond, Kentucky, by current owners Turnberry Partners, LLC. In view of the COVID-19 pandemic, and in an effort to prevent the spread of that virus, the pubic can view the meetings as they occur on the City's Community Information Facebook page. Anyone wishing to address the City Commission may submit comments on any topic or agenda item electronically to the City Codes and Planning Clerk at **tstone@richmond.ky.us** . The Agenda for the meeting can also be found on the city website. Citizens may also phone City Hall at **(859) 623-1000 ext. 1103** to provide a comment about an agenda item or concern if a computer is unavailable.

### MASTER COMMISSIONER'S SALE

Pursuant to Orders of the Madison Circuit Court, except as otherwise indicated, the Commissioner will sell the property described in the following actions on WEDNESDAY, SEPTEMBER 30, 2020, at the hour of 11:30 A.M., at the front door of the Madison County Court House, 101 West Main Street, Richmond, Kentucky. Unless otherwise indicated, said property shall be sold to raise the amounts hereinafter set forth, together with interest and the costs of the action. The Judgment and Order of Sale in each action shall govern the terms and conditions of each sale. At the time of the sale, the successful bidder may pay the full purchase price in cash. In the event the successful bidder elects to pay the ten percent (10%) deposit as set out in the Judgment and Order of Sale, he or she will be required to post bond and furnish an acceptable surety thereon for the unpaid balance of the sale price and said bond shall bear interest at the rate the judgment bears, from the date of sale until paid, and shall have the same force and effect of a judgment. THE MASTER COMMISSIONER CANNOT PROVIDE LEGAL ADVICE TO PROSPECTIVE BIDDERS. ALL INTERESTED PARTIES WITH QUESTIONS ARE ADVISED AND ENCOURAGED TO SEEK LEGAL ADVICE PRIOR TO THE SALE.

KENTUCKY SUPREME COURT RESPONSE TO COVID-19

The Supreme Court of Kentucky issued Orders, providing guidance on health and safety requirements for resuming court operations. To stay in compliance with said Orders, the following changes will be implemented for all Master Commissioner Sales:

1. All attendees SHALL BE REQUIRED to wear a protective facial covering such as a mask, scarf, bandana or other cloth which covers the nose and mouth;
2. Any person who has been asked to self-quarantine by any doctor, hospital, or health agency; or been diagnosed with COVID-19 within the past 14 days or had contact with anyone who has been diagnosed with COVID-19 within the past 14 days are asked NOT to attend the sales;
3. All attendees SHALL PRACTICE social physical distancing and maintain a distance of 6 feet apart;
4. Attendees shall maintain a distance of ten (10) feet from the Master Commissioner and his staff;
5. Sales shall be held on the courthouse steps, and grounds and Attendees will be in an area in front of the steps to be designated by the Master Commissioner. Attendees shall provide their own protection in the event of inclement weather, as they will be in an open area;
6. At the close of all the sales, successful purchasers shall not approach the Commissioner, but shall wait to be called forward to complete paperwork;

| | PROPERTY ADDRESS | PARCEL ID | CIVIL ACTION NO. | AMT. TO BE RAISED |
|---|---|---|---|---|
| 1. | 184 Baldwin St., Berea | B006-0002-0016 | 19-CI-594 | $ 76,583.18 |
| 2. | 204 Hanover Ave., Richmond | R011-0007-0004 | 19-CI-683 | $ 86,772.33 |
| 3. | 2498 Union City Rd., Richmond | 092A-0000-0018 | 19-CI-689 | $ 48,195.87 |

DAVID R. BAIRD, MASTER COMMISSIONER

### MASTER COMMISSIONER'S SALE

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6. At the close of all the sales, successful purchasers shall not approach the Commissioner, but shall wait to be called forward to complete paperwork;

| | PROPERTY ADDRESS | PARCEL ID | CIVIL ACTION NO. | AMT. TO BE RAISED |
|---|---|---|---|---|
| 1 | 680 Gumbottom Road, Waco | 0111-0000-0059-A | 18-CI-677 | $ 4,362.51 |
| 2. | 314 Peachtree Dr., Berea | 0073-0001-0008 | 19-CI-617 | $ 123,715.18 |
| 3. | 519 Orange St., Richmond | R009-0019-0006 | 20-CI-213 | $ 5,638.47 |
| 4. | 716 Candlewood Dr., Berea | 0060-0030-0106 | 17-CI-25 | $ 19,820.60 |
| 5. | 1025 Elizabeth Dr., Richmond | 0056-0006-0005 | 20-CI-133 | $ 43,999.20 |
| 6. | 965 Auckland Ave., Richmond | 0042-0034-0001 | 20-CI-159 | $ 213,473.91 |
| 7. | Harrison King Lane, Berea | 0073-0000-0022 | 19-CI-785 | $ 3,516.72 |
| 8. | 441 East Irvine St., Richmond | R009-0017-0002 | 19-CI-466 | $ 4,184.63 |
| 9. | 205 Kaye St., Berea | B001-0004-0004-B | 19-CI-670 | $ 135,026.15 |
| 10. | 140 Avawam, Richmond | 0025-0000-0011 | 20-CI-190 | $ 21,026.14 |

DAVID R. BAIRD, MASTER COMMISSIONER

## Summary Report Presented at Public Meeting

See recording of meeting that has been submitted.

# Public Meeting Attendance Sheet

The meeting was held on Facebook Live, thus there is no sign-in sheet.

## Minutes from the Public Meeting

See recording that has been submitted.

## Public Comments

There were no public comments.